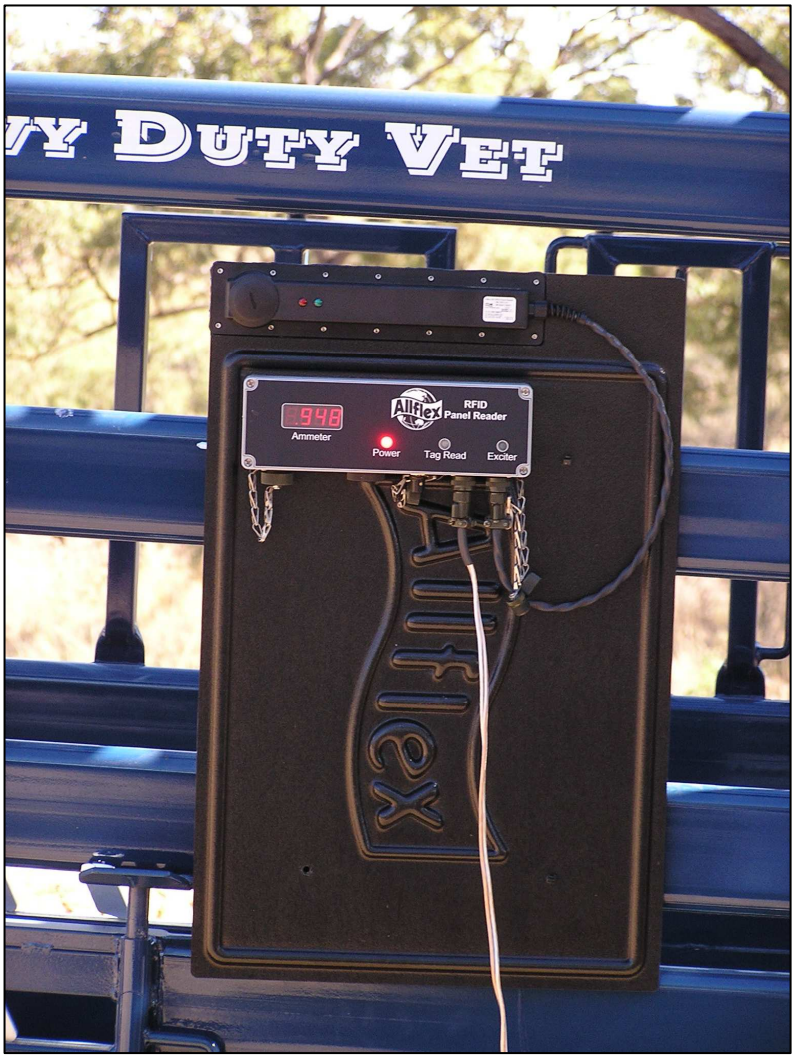
Allflex RFID Panel and Portal Readers



Identify the Difference

User Manual

(Version 2.4 April 2006)

Identify the Difference

Allflex Australia Pty Ltd

Panel Reader User Manual
Document Control Form

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Caution!

Please read the information contained within this Installation Guide prior to attempting installation and operation of the Panel Reader. Failure to install and operate the Panel Reader in accordance with the information contained in this manual may result in unsatisfactory performance.

Introduction

The Allflex Panel Reader comprises 2 parts, the antenna and the reader control electronics. The reader section is the electronics that generates the signal used to excite (power up) the RFID device (Radio Frequency ID). The device is also referred to as a transponder, electronic ID (EID), as well as electronic eartag , etc. The reader also decodes the signal returned from the RFID device. The transmission and receipt of signals between the reader and the RFID device is done via the antenna. The antenna is a specifically designed coil of copper wire enclosed within the plastic panel.

The Allflex Medium Panel Reader
(600mm x 400mm)

The Allflex reader is designed to read devices that meet international standards ISO 11784 and 11785. NLIS devices are ISO compliant devices. The reader electronics are housed inside a control box that also includes an ammeter, indicator lamps etc. The control box is usually fastened to the antenna using 2 x 5mm countersunk stainless steel screws. Please see Assembly Section.

A cable is supplied to provide 12volts DC to the control box. This cable can be clearly identified because it has alligator clamps on one end. The power source should be a standard automotive, truck or marine battery. A 240 Volt – 12 volt linear power supply is also available as an option.

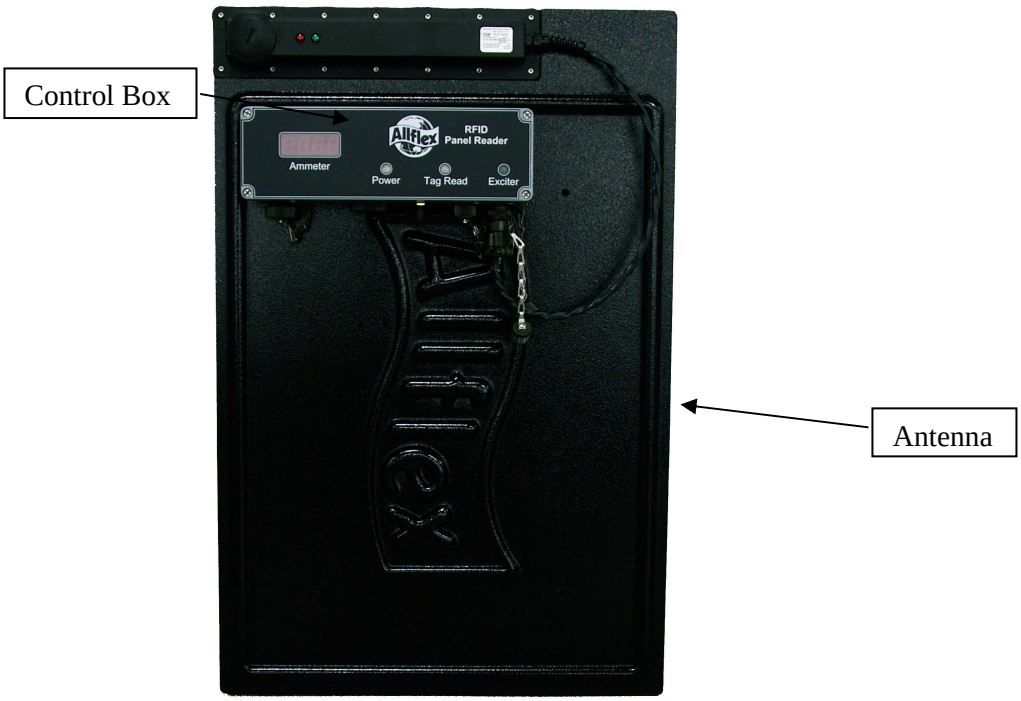
Note : Only the approved linear 240volt supply should be used because most 240 volt supplies will generate electrical interference that may cause the reader to perform poorly. A second cable, the communications cable, is also supplied to join the control box to a computer, scale head etc.

Each Panel Reader is factory tuned for optimum performance in an environment free from metal structures. Typically, the system will operate without user adjustment in many installations. Pre-drilled mounting holes in the black panel facilitate user installation, so that total system setup is fast and easy.

This instruction guide provides the user / installer with information about mechanical installation, electrical wiring, configuration, operation, and performance characteristics of the Panel Readers.

Assembly Instruction

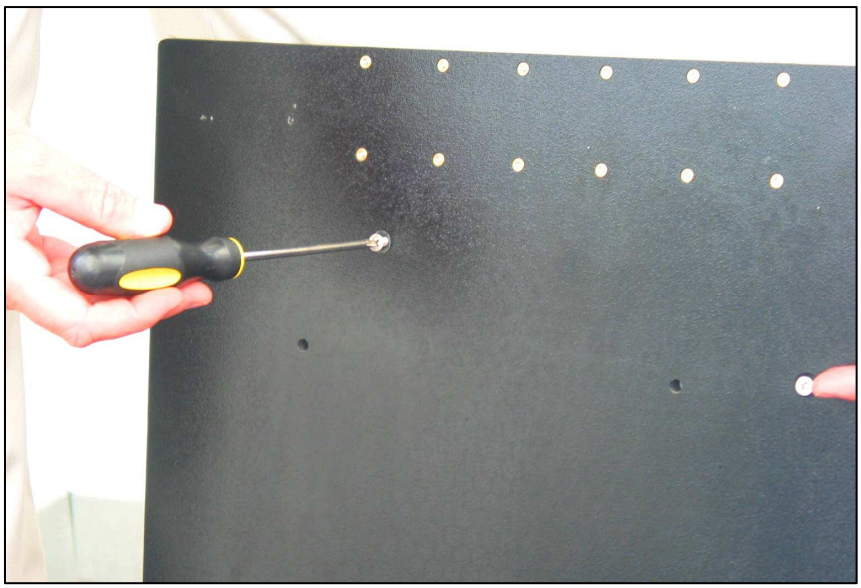
1. The Control Box mounts onto the panel as shown below. Note: the control box mounts in different locations dependant upon the size of the antenna (as shown below).



The Allflex medium size panel antenna

2. The system can be supplied with either a standard 500 mm cable, or an optional 5 metre cable to join the control box to the antenna. Usually, when using the standard cable, the control box can be fastened to the antenna using the two 5mm countersunk Stainless Steel screws provided with the antenna.

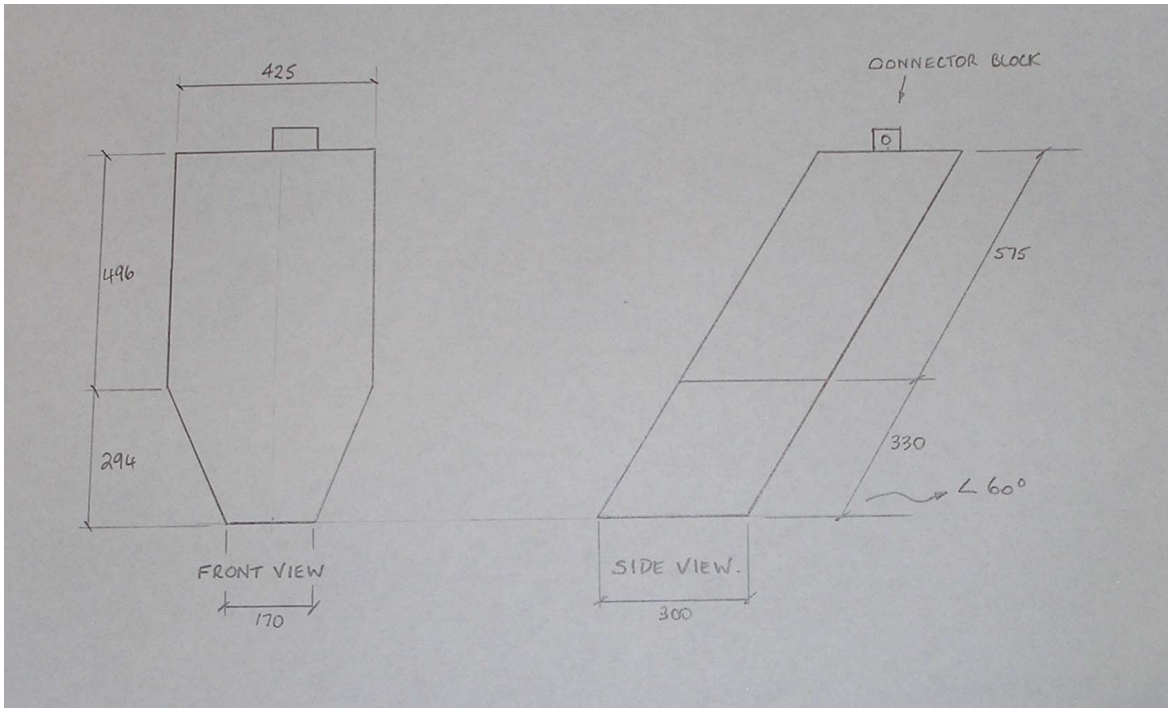
3. Screw the Control Box onto the panel using the pre-drilled and countersunk holes as shown here.



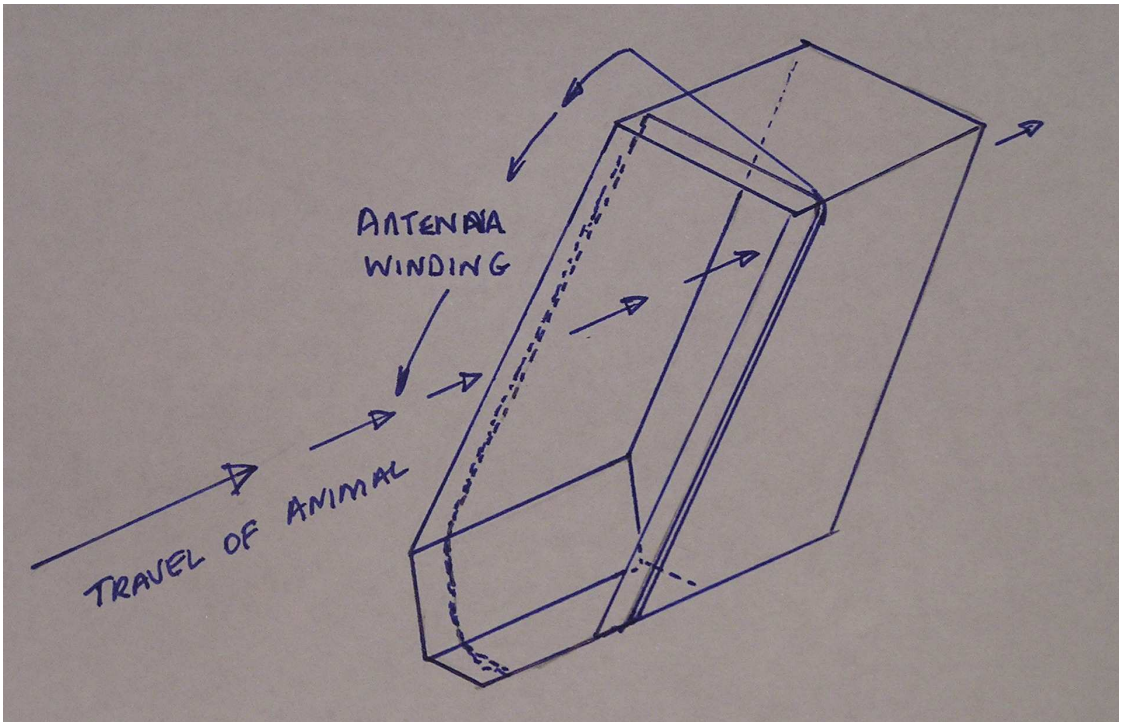
4. The Control Box joins to the antenna as shown in the picture below.

5. The power supply cable joins to the Control Box and connects to a standard car, truck or tractor battery. (as shown below).

Portal Antenna: The portal antenna is an optional replacement for the flat panel antenna and forms a tunnel that is placed in a stock race. The tunnel can be used bi-directionally. It is a structure formed from plastic that has a vee section base and rises from the ground at an angle of around 60 degrees as shown in the image and sketches below. Note – the portal joins to the control box via the blue cable supplied.

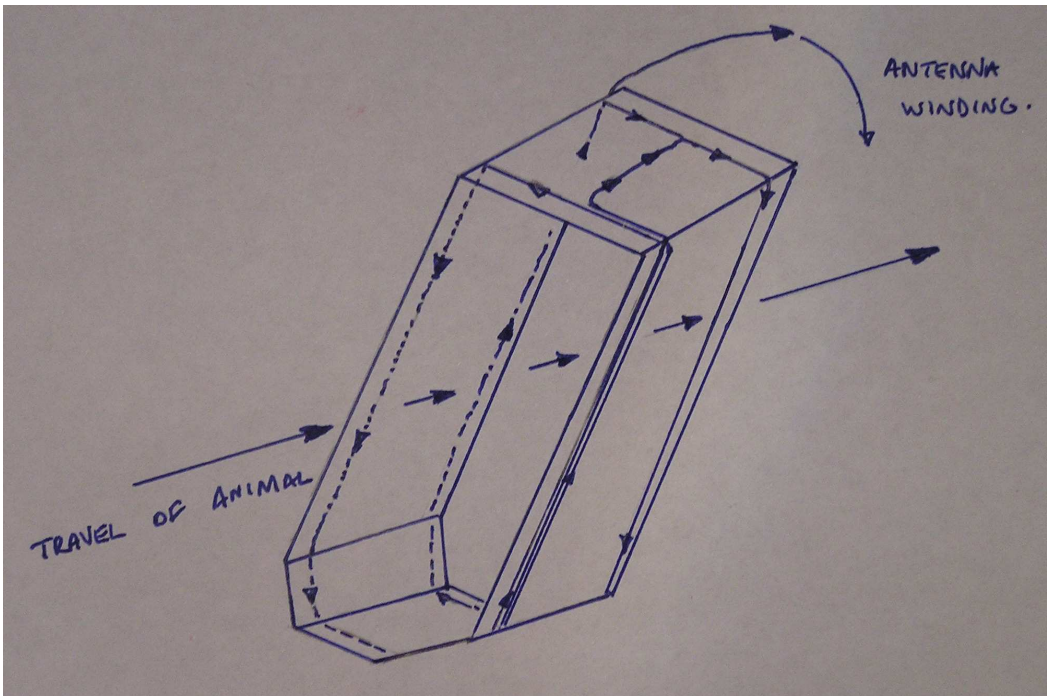


Into the structure an antenna is wound an antenna. The antenna involves multiple turns of conductor to form a loop. The loop runs parallel to the edge of the structure so the animal will pass through the loop as it enters the portal / tunnel.



The wire is then laid over to the other edge of the structure, where a second loop is wound. This loop is at the edge where the animal will exit the structure. Therefore the animal will walk through 2 loops formed from one single conductor. The start of the wire and end of the wire terminate at an electrical connector to allow circuit connection to the control electronics.

The first coil and second coil are wound in opposite directions (out of phase). This increases immunity to electrical noise.



The antenna structure is located between metal pipes section around 1 metre long that run in a horizontal plain. These can simply be sections of metal gates. Ensure they are very firmly fastened so that vibration of the metal is not evident.

These pipes act as radiators to expand the antenna read field. The metal bars also allow better coupling with the tag when in a horizontal plain. Many sheep RFID tags sit in a horizontal plain and for a simple panel antenna this is the worst orientation. However, in the portal reader, the effects of tag orientation are essentially removed because of the metal radiators and the fact that

the read field is laid over at 6o degrees. The Images below show tags being read in various orientations.

Another benefit of laying the coils over at an angle is to ensure that if a null zone is formed in the centre zone of the antenna, it (the null zone) will be on an opposing angle of 60 degrees. This means that it will be almost impossible for an animal to move through the antenna and follow the null zone (60 degrees to horizontal). Allflex has a Patent Pending for the portal reader.

Naturally a key benefit of the portal reader is that there is far less dependency upon what ear carries the RFID device.

The portal can be fastened directly to the metal pipes, or tied firmly in place.

Mechanical Installation

Choosing an Installation Site

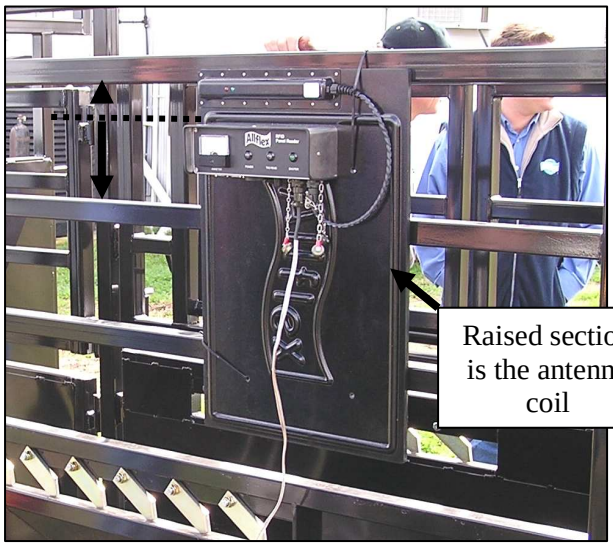
Several factors should be considered when selecting and / or constructing an installation site in order to ensure optimum performance of the Panel Reader. Prior to making structural changes to the target installation site, the user should temporarily install the reader in a manner that as closely as possible simulates the permanent installation.

(a) Metal surfaces and structures - The Panel Reader uses radio frequency techniques to communicate with the eartags. Metal material, especially metals that are magnetic can seriously degrade the read range performance through absorption and deflection of the Panel Reader's electromagnetic fields.

The reader cannot usually read through sheet metal. However, in some cases this is possible and the reader can usually be configured to read through metal pipes and still achieve good read distances as demonstrated in the images below.

Note that in the images above, the reader has literally been tied directly to the metal bars. In a practical installation, Allflex would recommend that you use a piece of marine plywood (or similar) in between the metal bars and the reader so that the reader is protected from direct impact from horns etc. Also in some cases, when mounting through steel bars, it is necessary to mount the antenna away from the bars. This depends upon the type of crush and the configuration of the pipe work.

If you do intend to mount the antenna to read through metal pipes, position the antenna so that the antenna coil, (the raised section) does not sit directly above the pipe work. Try and position the antenna so the coil is offset / spaced between the pipe work as shown.



Another issue to consider that will dramatically effect the performance of the reader, is to avoid positioning the antenna so that metal bars run parallel to the antenna coil forming a frame closely around the coil.

Hold the antenna in place or temporarily tie it in the desired location. Check the current displayed on the ammeter. Ideally, it should be around 1 amp. You may find that by simply

lifting one side away from the steel pipes, the current and read distance will be excellent. Verify that sufficient read range performance is possible.

Note the screw driver blade sitting between the panel and the steel.

The good read distance shown above has been achieved by lifting one edge off the steel. If you do temporarily position the reader like this, you can then mount the panel reader on ply in the desired position. You can adjust the current up to around one amp, which should give you great reading results, by either packing the antenna off the steel a little (using spacers), lifting one edge away from the steel (as shown above), or by adjusting the tune.

Tuning is a process that will adjust the antenna to perform in an area where an amount of conductive metal is in close proximity. This is discussed in detail later, however, if you require assistance, please call Allflex for telephone support. Allflex Australia – 07 3245 9100. Allflex New Zealand - 06 356-7199.

In some cases, it is more practical to mount the antenna on a non-metallic material such as timber and simply fit this into the crush (as shown below). This allows easy, installation and removal where the antenna is moved often and also provides excellent read distance.

Antenna mounted on ply

When you do mount a reader onto the steel pipe work of a crush etc, you will find the antenna transmits energy into the pipe work. What often happens is that the crush actually starts acting like an extension to the antenna. This is called the Parasitic Effect. For example, if you mount an antenna close to the front of a crush, (head bail end) you may notice that tags read outside the normal read range when they come close to steel pipes positioned at the entry to the crush (as shown below).

Usually, this parasitic effect is really helpful because it means that the animal is detected very quickly as it enters the crush or drafting crate, however, it may also mean that the system is very fast to read animals that follow closely the animal in the crush (IE if a second animal places it's head in beside the first beast, you may read the first animal and then the second, with the second animal being displayed on your computer or scale head). You need to understand how to deal with this situation if it occurs and how it affects the

data capture process either into scale heads, or the computer that you are using. In most cases the software has a means of coping with this.

(b) Electrical Machinery - Most 240 volt AC operated electrical machinery will not interfere with the Panel Reader's electrical signals. However, machinery that is electrically controlled by electronic methods, such as motor speed controls, light dimmers, and solid state relays can produce high frequency emissions that can cause interference. When the Panel Reader is being trial installed, the user should run all the machinery in the vicinity to ensure that all potentially interfering sources do not exist. When wiring an AC mains operated power supply for use with the Panel Reader, avoid wiring the AC connection to the same phase as such electric machinery is wired.

(c) Other Eartags - If the Panel Reader is being installed in a location where eartagged animals will exist on all sides of the Reader (such as a feeder), precautions must be taken to ensure that only animals within the designated reading zone are read. This can usually be achieved by positioning sheet metal, or mesh in an appropriate location between the reader and the area where you want to "block" reading. If you do have multiple eartags simultaneously present in the read zone of the antenna, either eartag might read, both eartags might read, or neither eartag might be read.

(d) Other Readers - Operating multiple Panel Readers within close proximity, or operating a mobile hand-held reader nearby a Panel Reader, can reduce the read range of all readers present. In some cases this can totally inhibit reading of all readers. If multiple readers are to be used in proximity to each other, it will be necessary to synchronize the readers. Synchronization will require additional hardware equipment. Please call Allflex for assistance with synchronization. Allflex Australia – 07 3245 9100. Allflex New Zealand - 06 356-7199.

Once a suitable location site and installation method have been determined, the Panel Reader can be permanently mounted in position using the ¼" (6mm) pre-drilled mounting holes. If it is necessary, alternate or additional mounting holes may be drilled by the user, using caution to drill only within the rectangle defined by the existing mounting holes. Standard steel bolts will not compromise Panel Reader performance.

Note - The Panel Reader is designed to be completely water-tight. While not intended for installation immersed in water, contact with water spray, such as heavy rain or power washers is acceptable.

Caution! - Ensure that the mounting structure itself is sufficiently strong enough to endure impact by animals that will come into contact with it. Do not rely on the Panel Reader to contribute to the structural strength of the installation.

Electrical Installation

Electrical installation consists of making the appropriate power and data connections to the user's equipment. In some installations, where multiple Panel Readers are located and operating at the same time, synchronization wiring will be required.

Power Source Requirements

The Panel Reader is supplied with a cable that allows direct connection to an automotive, truck or marine battery. A 240 volt powers supply is also available as an option. It is recommended that you use a well charged automotive battery or the recommended 240 supply. This is important because the 240 volt supply is a "linear" regulated type unit rated at 12 VDC output and 3.0 amperes minimum. Some AC power supplies may exhibit excessive noise that can compromise read range of full duplex (FDX-B) (sheep / small stock) type transponders. AC power supplies should be rated at 3 millivolts or less output ripple.

Users can purchase the recommended power supply from Allflex. It will be supplied in an appropriate weather-proof enclosure (IP56). Alternatively, users can purchase their own linear power supply and have a suitably qualified electrician mount the device into an appropriate enclosure. The linear supply required is a Condor brand, part number HC12-3.4+. The part can be purchased directly for a company called RS Components for around Aus$100. The RS stock number is 383-9435. The unit can be purchased from RS Components over the phone using a credit card on 1300 656 636.

The Under Voltage Alarm

The circuitry in the control box has been designed to let the user know when battery life is low. If the voltage falls bellow 11 volts, the red power light on the face of the control box will start to flash signaling a possible decline in performance.

Note - The Panel Reader does not contain a power on/off switch. When a power source is connected to the Panel Reader it will commence immediate operation. When powered from a battery source, be sure to disconnect the battery when the Panel Reader is not in use in order to conserve battery life.

Note - The Panel Reader is polarity protected against accidental reverse voltage application and will not be damaged by such. However, reversing the power connections will prevent the Panel Reader's operation.

Serial Data Communications

The Panel Reader is provided with RS232 serial communications interfaces. RS232 is generally used in short run (less than 15 meters/50 feet) configurations where the data recording equipment is provided with a compatible RS232 interface. Longer cable lengths are possible also when data communications rates are low (9600 bits/second and lower). A standard 5 metre cable is provided.

When long cable lengths are required between the Panel Reader and the data recording equipment, when data communications rates greater than 9600 bits/second are being used, or when bus communications are being used, the Panel Reader's RS422/RS485 option should be discussed with Allflex.

Note - Serial communications for all interfaces are *half duplex* – that is, communication exists both *to* and *from* the Panel Reader, but not simultaneously. While ID Code data is being transmitted from the Panel Reader, communications to the Panel Reader cannot be received simultaneously.

Note - RS232 and RS422/RS485 interfaces are concurrently enabled but only RS 232 is wired to the connector on the control box. At all times, the Panel Reader can receive commands through either interface. However, both interfaces are coupled to a single receive input pin on the Panel Reader's internal circuitry. Consequently, if inputs are applied simultaneously on both RS232 and RS422/RS485 interfaces, the commands will collide and be unrecognizable to the Panel Reader. The user should employ only one of the interfaces for sending commands to the Panel Reader.

Note - Both RS232 and RS422/RS485 outputs can be simultaneously used. For example, the RS232 output could be connected to a weigh-scale and the RS422 output could be connected to a data recording device. Only one of these two user equipments should, however, have its transmit output connected to the Panel Reader's receive input, as is explained earlier.

RS232 Serial Data Interface

The RS232 serial data interface comprises a 3-wire arrangement, consisting of transmit (TxD), receive (RxD), and ground (GND). This interface can be configured for a variety of communications parameters, but is factory configured with default settings of 9600 bits/second, no parity, 8 bits, and 1 stop bit ("9600N81"), and no flow control. To determine the required settings, refer to the interface requirements for the data recording application that is being used with the Panel Reader. To change these default settings, please see "Configuration Options" section.

Serial data appears on the Panel Reader's TxD connection in ASCII format, and is compatible with most PC terminal emulator programs, such as HyperTerminal®. Configuration options provide flexible formatting of transponder ID code information (see "Configuration Options"). The default formats for ISO transponder tag types are listed in Table 2 on page 2 of this guide.

RS422/RS485 Serial Data Interface

The Panel Reader's RS422/RS485 is not wired from the circuit board unless specifically required. RS422/485 serial data interface comprises a balanced 4-wire (RS422) or balanced 2-wire (RS485) arrangement, which is capable of being used in any of several wiring

configurations. The balanced nature of this interface provides the ability to achieve long data communications cable lengths of up to 1500 meters (5000 feet) at the maximum communications data rate of 57,600 bits/second.

An excellent technical guide to RS422/RS485 communications can be found on, and downloaded from, B&B Electronics' Internet web-site at:
http://www.bb-elec.com/tech_articles/rs422_485_app_note/table_of_contents.asp
Users who are planning to connect several Panel Readers on an RS422/RS485 bus should consult Allflex.

Performance Verification

Using several test eartags of the types to be used with the Panel Reader, the user can verify read range and read zone area of the installed system by using the green light and beeper as an indication of when the Panel Reader is correctly reading the eartags. Under optimum conditions the read ranges listed in Table 4 are typical expected performances.

Table 1 - Nominal Read Distance Performance

Transponder Type / Input Voltage	Medium Panel Antenna 600 x 400mm
NLIS – Half Duplex HDX @ 12 VDC	875 mm
HDX / Light Weight Small Stock Tag @ 12 VDC	650 mm
FDX-B Light Weight Small Stock Tag @ 12 VDC	600 mm

Among many influences, the read distance performance of the Panel Reader will be affected by the following:

Eartag Orientation - For maximum reading distance, the axis of the eartag and reader antenna coils must be optimally oriented (see Figure 5).

Eartag Quality - Each manufacturer's eartag differs in (a) the amount of exciter signal energy necessary to sufficiently operate the eartag's internal circuitry, and (b) the signal level of the ID Code information that is returned to the reader. Consequently, it is normal for eartags of a common type (FDX-B, for example) made by different manufacturers to exhibit different read range performance characteristics.

Eartag Motion - The Panel Readers have different size antennas, and the smaller antennas produce smaller effective "read zones". Panel Readers are generally designed for reading eartags while in motion, both translating and rotational. An eartag that is moving quickly through the read zone while simultaneously changing orientation may not be present within the reader's read zone sufficiently long for all the ID Code information to be obtained.

Eartag Size - Physically larger eartags generally contain larger antenna coils which produce longer reading distances than smaller eartags having small antenna coils.

Eartag Type - HDX eartags (NLIS type tags) generally exhibit greater reading distances than FDX-B (Small Stock) eartags of comparable size.

Proximal Metallic Objects - Metal objects located near the eartag or Reader can attenuate and distort the electromagnetic fields generated in RFID systems, and thus diminish read distance performance.

Electrical Noise Interference - RFID eartags and readers use electromagnetic signals as a premise of operation. Other electromagnetic phenomena, radiated electrical noise from

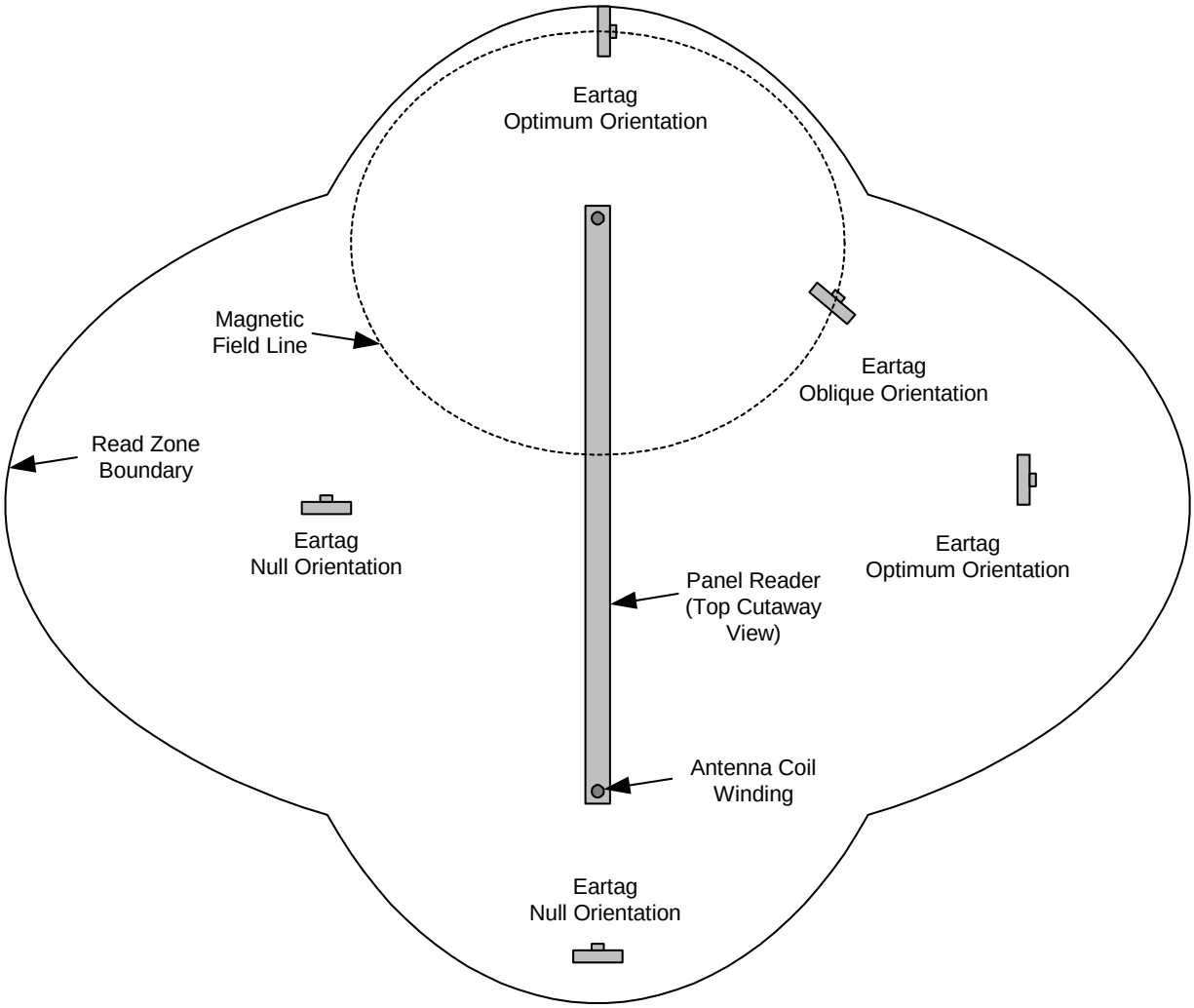
computer displays, for example, can interfere with the transmission and reception of RFID signals, and consequently reduce reading distance.

Eartag/Reader Interference - Multiple eartags within the sensing range of the reader, or other readers emitting excitation energy in the immediate vicinity can adversely affect the reading performance or prevent operation of the Panel Reader.

Panel Reader Read Zone Geometry

The read zone is the 3-dimensional space within which an eartag can be read when held in a static and optimum orientation. Figure 5 approximates the Panel Reader's read zone in a 2-dimension perspective, as viewed from either the side or top, and illustrates eartag orientation for maximum and null reading. Optimum read distance is achieved when the Panel Reader's magnetic field lines intersect the surface of the eartag perpendicularly. More practicably, the eartag's read range is maximized when the eartag's axis is perpendicular to the midpoint of the Panel Reader's flat surface. As the eartag is shifted from midpoint toward an edge of the Panel Reader, maximum read distance is usually achieved by tilting the eartag so as to maintain perpendicularity with the magnetic field lines as shown in the diagram below.

Panel Reader Read Zone and Tag Orientation



Interpreting Tag ID Code Information

Table 2 lists the default data formats that are transmitted from the Panel Reader's serial communications port, in response to reading compatible type tags. For ISO type tags, there is no difference between HDX and FDX-B outputs. Both types of tags produce a default format:

LA_982_000001088420<CR><LF>

where the underscore "_" represents a space character, and <CR><LF> is a carriage return /line feed (unprinted control characters which cause a PC's display cursor to jump to the beginning of the next line prior to displaying the next ID number).

In the above data output, the prefix "LA" represents "line mode – animal coded read only tag", "982" is the Allflex manufacturer number assigned by ICAR, and the last 12 digits comprise a unique number sequence for this particular transponder.

The TIRIS S2000 output format has become a de facto standard for many users, and appends the *reserved field* and *data block* bits contained in the ISO coded eartag to the Panel Reader's default format, causing the ID code information to appear in the format:

LA_00000_0_982_000001088420<CR><LF>

This output is easily configured using either the *Configurator*® utility, or by issuing the Command "BE40239" to the Panel Reader (see "Configuration Options").

Note - The manufacturer code "982" will be different for another manufacturer's tag, and can also be replaced by an ISO country code ("250" = France, for example). When other manufacturer codes or country codes exist, there can exist the same 12 digit ID number.

Note - While HDX and FDX-B type transponders have an identical context, they are guaranteed by Allflex to be unique. That is, HDX tag type ID numbers are never duplicated in FDX-B type tags.

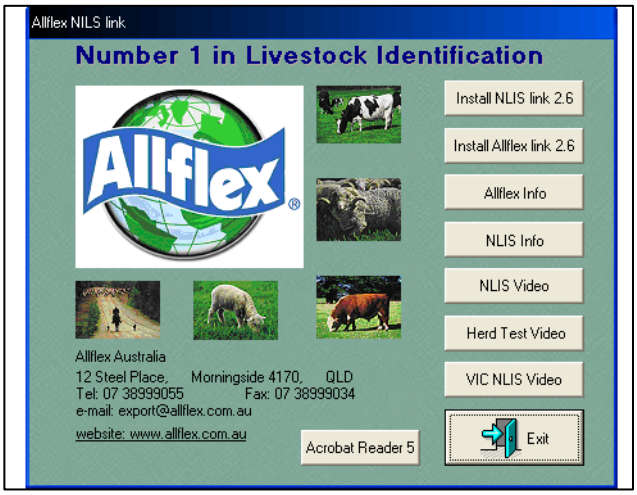
For HDX Industrial coded tags, the output format is:

LR_0006_0000000018514348<CR><LF>

In this tag format, the prefix "LR" represents "line mode – industrial coded read only tag", "0006" is an application code unique to Allflex, and the last 16 digits comprise a unique identifying number sequence.

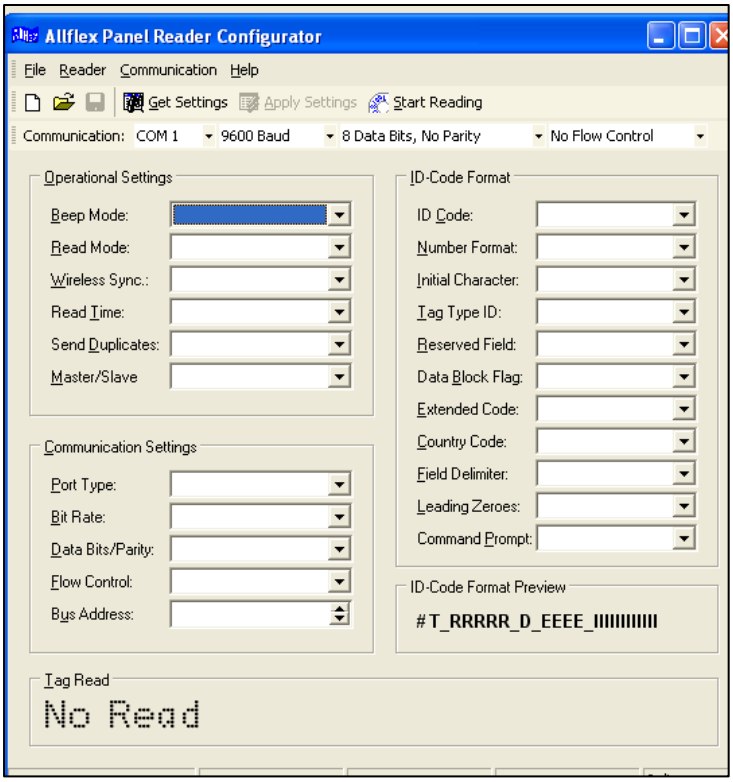
Panel Reader *Configurator*®

The Panel Reader is shipped with this Installation Guide and a CD copy of a PC Microsoft Windows® compatible application program *Configurator*®. *Configurator*® is an easy to use utility that aids in changing the factory set default options in the event the user wishes to customize the behavior of the Reader and the ID number format. *Configurator*® is a self-installing program. Usually you should not need to change the factory default settings, however, if you are required to do so, please follow these instructions to install Panel Antenna *Configurator*® Program.



Insert the CD into your drive on your computer. It will automatically start and present this menu on your screen. Select the exit option. Open the Windows Explorer© program (right click on the START button and select Explore).

To install the *Configurator*® Program. You can either (a) use Windows Explorer to browse the CD drive and you will see a directory called Tech. Open the Tech directory and you will then see a directory called Panel Reader. Inside the Panel directory there is a file called *Panel Configurator V0_11 Installer.exe* Double click on this file to commence the install process, or (b) click on the START Button (Bottom left corner of your screen) then select RUN. Select Browse. Select your CD drive (usually D drive). Select Tech, then Panel Reader, then select Panel Configurator V0_11 Installer.exe And then click OPEN to commence the install process..



Install the program by following the prompts on the screen. If you are unsure, select all of the settings recommended to you by the install program. If you need assistance, please call your local Allflex Office.

Once the *Configurator*® is installed, connect your antenna to your computer using the serial communications cable supplied. Connect the cable between your antenna control box and to a free serial port on your computer. Power up the antenna. Start the *Configurator*® program by double clicking on the *Configurator*® icon on your desktop.

Select the appropriate PC COM port at the top of the screen, and *Configurator*® will automatically poll the serial port, identify the Panel Reader, and display the current

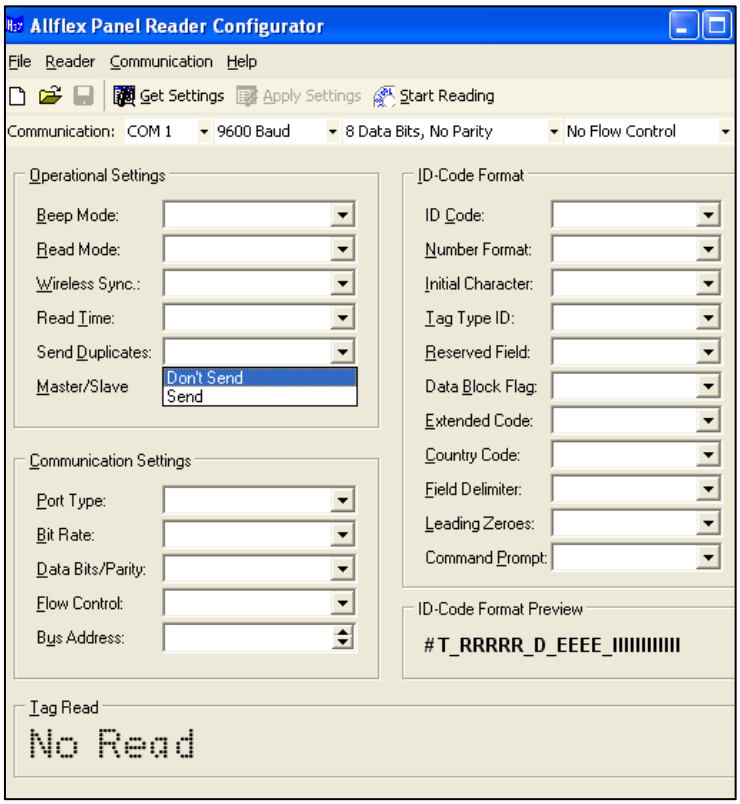
configuration settings. *Configurator*® comprises a single window display within which all options are listed and all possible settings are viewable in drop-down menu boxes.
The *Configurator*® program will automatically determine the communications settings that are effective in the Panel Reader. The factory default settings are 9600 bits/second, no parity, 8 bits/word, 1 stop bit, and no flow control. If these parameters are changed by the user, these settings will be automatically detected by *Configurator*®.

The settings should automatically appear from the reader in the boxes of the program. However, if not – select the GET SETTINGS icon or select the READER button and the then GET SETTINGS (F2 Key). This will bring the settings into the program.

After the settings have been brought into the *Configurator*® Program, make the appropriate changes you desire. Then you will need to apply these settings. To do this, select the APPLY SETTING icon, or select READER and then APPLY SETTINGS or press the F3 key.

A typical example of where changing a setting might be necessary is to change the reader so that it sends duplicates, or perhaps, not to send duplicate reads. This means that if a beast gets read 20 times as it walks past an antenna, the reader will transmit the number 20 times to the computer / scale head. Some scale heads are set for this such as the Trutest XR and SR series. Some other brands such as the Ruddweigh 500 and 600 series require the number once only. Therefore, in Australia and New Zealand, the Factory Default Settings are changed just in case the reader will be connected to a Ruddweigh system. This means that the Send Duplicates function is set to "Don't Send'

If you have to change this setting, or if your panel gets accidentally set back to factory default settings, you can change the Send Duplicates function by the following process. Use this as an example for changing any settings you need to change.



Select the function you wish to change such as "Send Duplicates". Use the down arrow at the end of the box to list the options. Select the Option you require – such as "Don't Send". Then Select the APPLY SETTINGS icon.

Generally, this is the only setting that requires changing in Australia or New Zealand.

If you require assistance with any other setting – please call your local Allflex Office.

Table 2 - Factory Default Configuration

Option	Default Configuration
Serial Data Settings	Duplicate tag reads are transmitted (this is reconfigured in Australia and NZ before panel readers are sent out. If the panel gets defaulted – duplicates will be sent)
Serial Hardware	9600 BPS, no parity, 8 BPW, 1 stop bit, no flow control
Miscellaneous	LED Indicators *on*, Continuous Reading *on*, Wireless Sync *off*
Serial Bus Address	Disabled (not assigned)

Table 3 - Default Serial Data ID Code Formats

Tag Type	Default Format
HDX ISO (NLIS Cattle Tags)	LA_982_000001088420<CR><LF>
HDX (Industrial Re-useable)	LR_0006_0000000018514243<CR><LF>
FDX-B ISO (Light weight tags – sheep, goats, etc)	LA_982_000000255895<CR><LF>

Note: _ = space; <CR> = carriage return; <LF> = line feed

These settings are usually accepted by most software systems and scale equipment suppliers.

Note - If the Panel Reader is located close to (less than 2 meters) the PC being used for configuration, the Reader's read range performance may be reduced. This has no affect on the configuration setting process, but will interfere with any performance measurements the user might wish to make.

Configuration Options

In addition to using the Allflex Configurator program, configuration options can also be set using alphanumeric commands from a PC terminal emulator program, such as Microsoft Windows HyperTerminal®, or from a user proprietary program that is capable of similar communications, using the Panel Reader Serial Command Language.

Serial Command Language Method - Basic Instructions

The following instructions describe some of the basic and more frequently used configuration options, and illustrates how to implement them using the Panel Reader Serial Command Language in conjunction with HyperTerminal®. The Command Language method uses upper and lower case alpha characters combined with hexadecimal characters to establish the Reader's configuration. The most common commands are listed in Table 4.

Table 4 - Frequently Used Command Language Characters

Command	Application
P	Reader's current settings are sent in command language format
Bnnnnnn	Configures ID code serial data format
Snn	Sets serial data communications parameters
Inn	Sets miscellaneous options
W00	Sets serial bus mode address
? or H	Retrieves list of valid Command Language characters

Note - In Table 4, commands followed with "n" (hexadecimal characters) require the user to press the PC's <Enter> key after typing in all command characters. Single letter commands do not require <Enter> to be pressed, except as noted in Table 5.

Command Language Examples:

Retrieve Current Configuration Settings:

User:	P	Comment
Reader:	*Allflex Panel Reader	Product Identity
	*HW V1.01	Hardware Version Number
	*SW V1.05	Software Version Number
	*PR V2.24	Protocol Version Number
	*B-840239	Serial Data Format Setting
	*S-0C00	RS232/RS422 Settings
	*I-01	Miscellaneous Settings
	*W-00	Serial Bus Address

Example - Change Communications Bit Rate to 1200 BPS:

User:	S0900<CR><LF>	(<CR><LF> same as 'Enter')
Reader:	*S-0900<CR><LF>	Command Confirmed

Example - Change ID Code Transmit Format to Hexadecimal:

User:	B850239<CR><LF>	(<CR><LF> same as 'Enter')
Reader:	*B-850239	Command Confirmed

Example - Start Read Cycle (Requested read mode):

User:	R	(<CR><LF> not required)
Reader	LA_982_000000678234<CR><LF>	(if tag found)

For a complete description of all commands and configuration option variables, please refer to the Panel Reader Serial Command Language Manual which is attached as Appendix 1.

Panel Reader Tuning

The Panel Reader is factory tuned for optimum performance in the absence of nearby metallic objects. In some mechanical installations, mounting the panel reader near stationary metal objects is unavoidable, and sometimes it becomes necessary to install metal shields behind the Panel Reader in order to limit its effective read zone. In these instances, the presence of metal can detune the Panel Reader's antenna circuit, and compromise performance. The easiest way to determine this is to simply measure the Panel Reader's reading distance with and without metallic object's present.

When it has been determined that a metal object does compromise the read distance performance, it may be possible to retune the Panel Reader. In order to do this, please refer to the separate tuning document supplied with your reader.

Panel Reader Synchronization

Please consult Allflex before attempting synchronization. When multiple Panel Readers are installed nearby one another, in some instances there may be mutual interference induced among them due to their independent exciter signal timing. If Panel Reader performance is compromised or inhibited when a second Panel Reader is activated, the user should employ the wired synchronization option. In order to synchronize the control boxes for both readers must be upgraded to include a synchronization board. Both boxes then need to ne joined using a specific cable. One reader unit must be configured as a *master* unit, and all others must be configured as *slave* units, using *Configurator*®. Detailed instructions must be sought from Allflex for the synchronization option.

READER TECHNICAL SPECIFICATIONS

GENERAL	
RFID Compatibility:	ISO 11784 & 11785 HDX and FDX-B
Form Factor:	Flat Laminated Plastic Enclosure w/accessible electronics compartment
User Interface:	Red LED "Exciter Active" Visual Indicator Green LED "Good Read" Visual Indicator RS232/RS422 Serial Data Port
RS232 Serial Port:	300 BPS to 57.6 KBPS (9600N81 default setting)
Serial Data ID Code Format	Decimal or Hexadecimal w/flexible formatting options
Memory:	Retains last ID Code read in non-volatile memory for retransmission
User Options:	Non-volatile mode control options selectable via RS232 serial port interface
Power/Data Interface:	3 meter straight cable (unterminated) / can be extended
Antenna Tuning:	Capacitor array located inside reader compartment
Battery Power:	6 to 12 VDC ("-10x" models only / "-00x" models limited to 6VDC operation only) (External Battery or Mains Powered Linear Regulated Supply)
Agency Certifications: (*PENDING)	Electromagnetic Compatibility - FCC Part 15 Class A, and CISPR 22 (EN55022), and EN50082-1 ISPRA Certification*

PHYSICAL/ENVIRONMENTAL	
Panel Reader Model	**Medium Panel Antenna PNL-4060-001**
Dimensions:	40cm x 60cm x 30mm
Weight:	~ 6 kg
Material:	ABS UL94 HB Plastic
Color:	Black ABS
Operate Temperature	-10ºC to +55ºC (IEC68.2.1/.2)
Storage Temperature	-40ºC to +85ºC (IEC68.2.1/.2)
Humidity:	0 to 100% (IEC68.2.56)
Altitude:	-100 to +3,000 meters
Mechanical Shock:	Per IEC 68-2-27 (15g/11mS sawtooth) & 1 meter free-fall drop onto concrete)
Vibration:	Per IEC 68-2-6 (10-55 Hz sinusoidal/0.75mm displ./1 oct/min./10 cycles)
Hermeticity:	IP-67 (dust-tight/immersible) per IEC 529

RELIABILITY	
MTBF:	50,000 hours
MTTR:	0.5 hours (field replaceable electronics module)
Expected Life:	5 years, minimum

PERFORMANCE			
Panel Reader Model	**Medium Panel Antenna PNL-4060-001**		
Read Distance: (@ VDC battery) (add ~ 20% for 12VDC)	80cm (HDX/HP)[1] 55cm (FDX-B/HP)[2]		
Reading Orientation:	0º to 45º with less than 10% range decrease		
Read Zone:	80% of read distance across entire panel surface on either side		
Interrogation Rate:	~ 9 times/second		
Read Error Rate:	Less than 1 in 10^6		
Exciter Signal Radiated Field Strength:[3] @ 10 meters w/6VDCinput @ 10 meters w/12VDC input	94 dBuV/m 100 dBuV/m	103 dBuV/m 109 dBuV/m	112 dBuV/m 118 dBuV/m

[1]Allflex 30mm HDX/HP eartag

[2]Allflex 31mm FDX-B/HP eartag

[3]Note: Maximum legally allowed operating voltage in U.S. and Canada for PNL-60120 is 6.0 volts DC for both –00x and –10x models)

Panel Reader Physical Integrity

The Panel Reader has been constructed from rugged and durable materials to provide long periods of service in harsh environments. It is water proof, and can withstand direct water spray in use and for cleaning. The Panel Reader Control Box does contain electronic components, however, that can be damaged if subjected to extreme intentional abuse, and such damage can deteriorate or terminate the Reader's functioning. Damage resulting from such is not covered by the Limited Product Warranty describe below.

Limited Product Warranty

Allflex warrants this product against any defects that are due to faulty material or workmanship for a period of one year after date of purchase. This warranty does not apply to any damage to the product resulting from accident, misuse, modification, or application other than that for which it is intended and that is described within this User Manual.

If the product should become defective within the warranty period, Allflex will repair or replace it at no charge. Allflex will return the product, shipping paid, provided it is shipped at customer cost to Allflex.

Allflex Offices:

Allflex Australia Pty Ltd	Allflex USA, Inc.	Allflex New Zealand
33 Neumann Road	P.O. Box 612266	Private Bag 11003
Capalaba, QLD,	Dallas/Ft. Worth Airport	Palmerston North
4157	Texas 75261-2266	New Zealand
Tel 61 (07) 3245 9100	Tel (972) 456-3686	Tel 64 (06) 356-7199
Fax 61 (07) 3245 9110	Fax (972) 456-3882	Fax 64 (06) 358-5982

www.allflex.com.au

FCC ID: NQY-930012 (PNL-4606-001)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

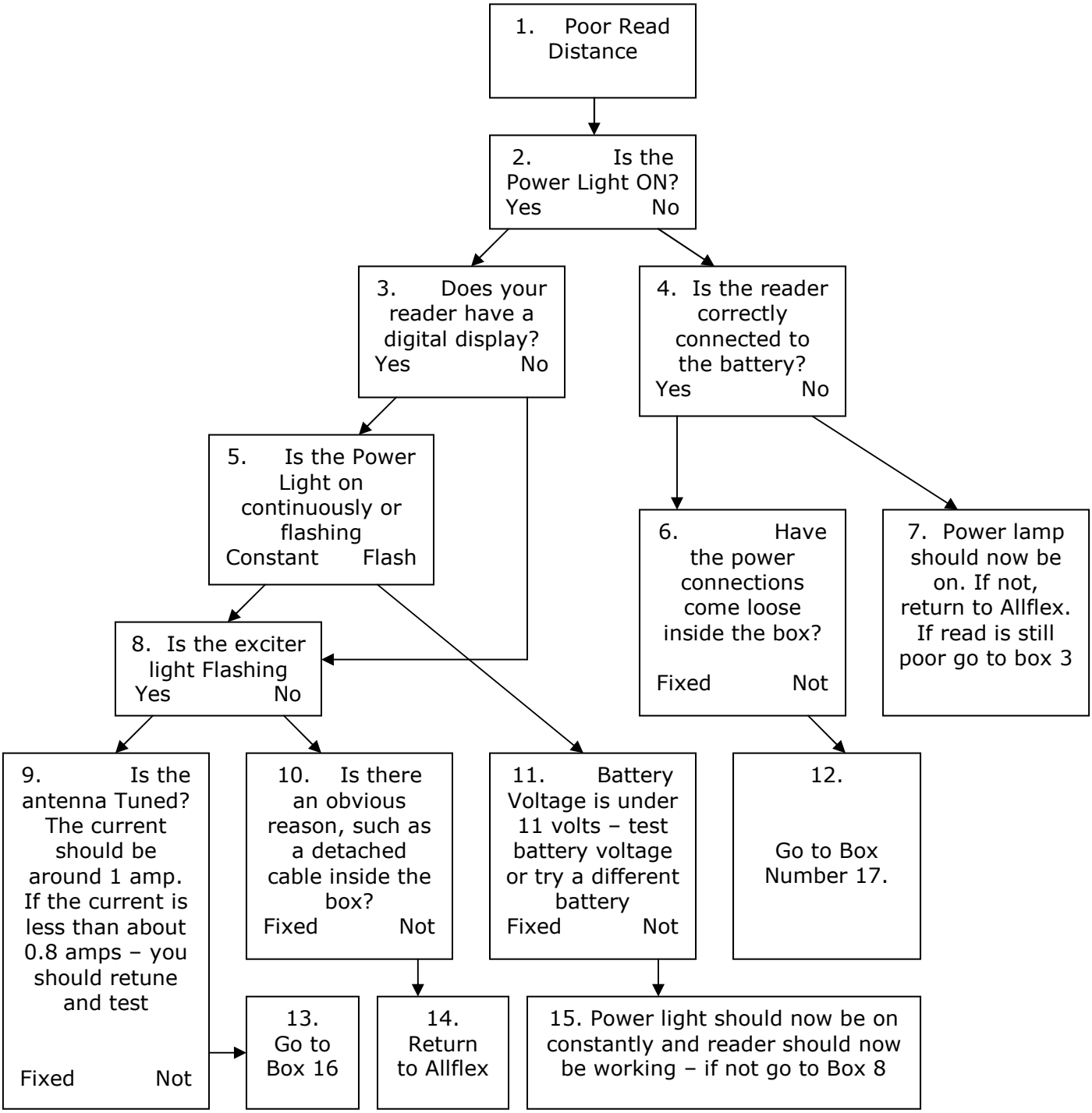
This device has been tested and meets the Electromagnetic Compatibility (EMC) requirements of EN50082-1 and EN50022 for the CE Declaration of Conformity (DoC).

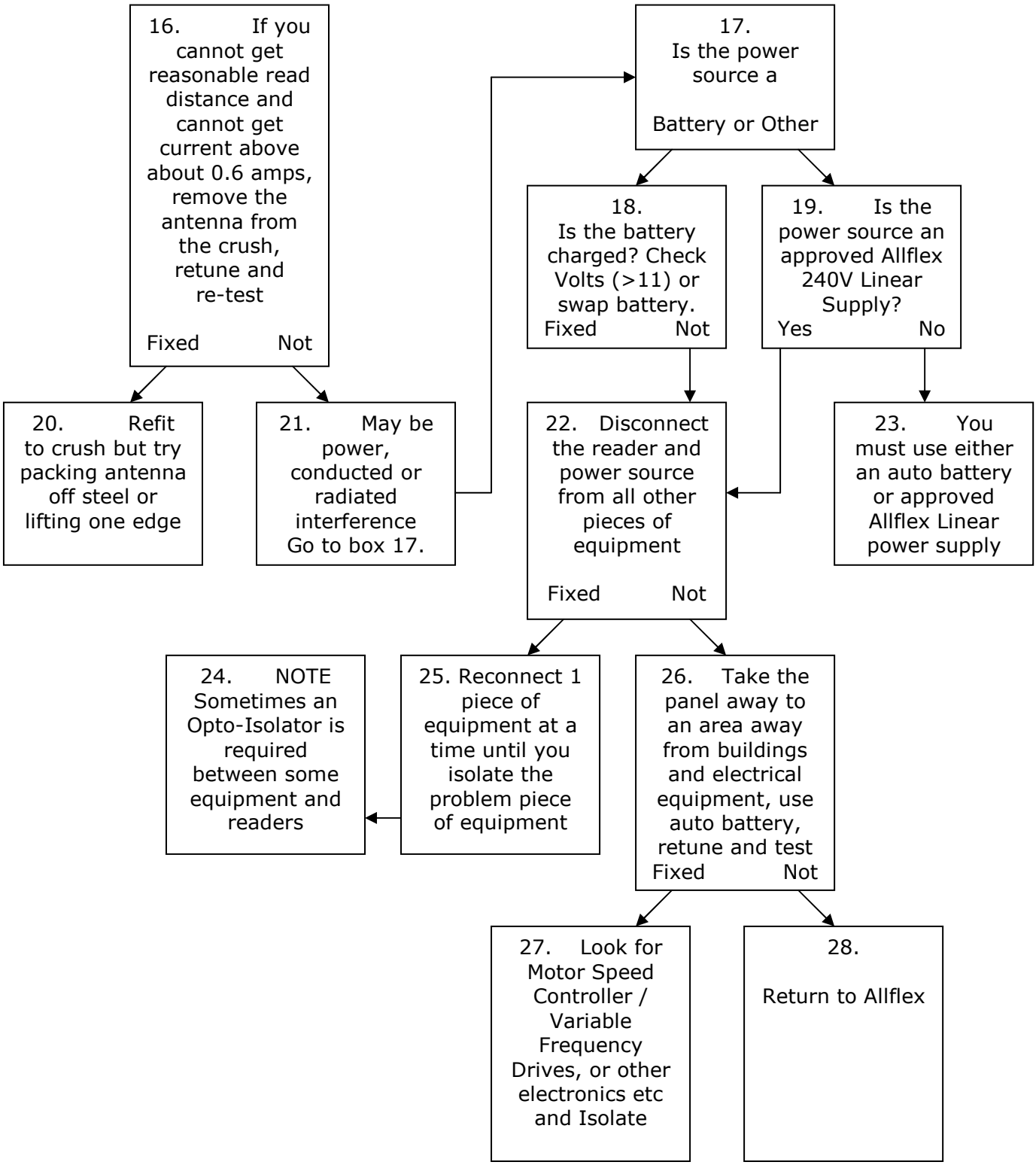
Caution

This equipment has been designed, constructed, and tested for compliance with FCC Rules that regulate intentional and unintentional radiators. The user is not permitted to make any modifications to this equipment or use it in any manner inconsistent with the methods described in this User Manual, without express approval from Allflex. Doing so will void the user's authority to operate this equipment.

Fault Finding

Panel Antenna – Common Faults


1. Poor Read Distance
2. Is the Power Light ON?
Yes No
3. Does your reader have a digital display?
Yes No
4. Is the reader correctly connected to the battery?
Yes No
5. Is the Power Light on continuously or flashing
Constant Flash
6. Have the power connections come loose inside the box?
Fixed Not
7. Power lamp should now be on. If not, return to Allflex. If read is still poor go to box 3
8. Is the exciter light Flashing
Yes No
9. Is the antenna Tuned? The current should be around 1 amp. If the current is less than about 0.8 amps – you should retune and test
Fixed Not
10. Is there an obvious reason, such as a detached cable inside the box?
Fixed Not
11. Battery Voltage is under 11 volts – test battery voltage or try a different battery
Fixed Not
12. Go to Box Number 17.
13. Go to Box 16
14. Return to Allflex
15. Power light should now be on constantly and reader should now be working – if not go to Box 8


16. If you cannot get reasonable read distance and cannot get current above about 0.6 amps, remove the antenna from the crush, retune and re-test
Fixed Not
17. Is the power source a
Battery or Other
18. Is the battery charged? Check Volts (>11) or swap battery.
Fixed Not
19. Is the power source an approved Allflex 240V Linear Supply?
Yes No
20. Refit to crush but try packing antenna off steel or lifting one edge
21. May be power, conducted or radiated interference Go to box 17.
22. Disconnect the reader and power source from all other pieces of equipment
Fixed Not
23. You must use either an auto battery or approved Allflex Linear power supply
24. NOTE Sometimes an Opto-Isolator is required between some equipment and readers
25. Reconnect 1 piece of equipment at a time until you isolate the problem piece of equipment
26. Take the panel away to an area away from buildings and electrical equipment, use auto battery, retune and test
Fixed Not
27. Look for Motor Speed Controller / Variable Frequency Drives, or other electronics etc and Isolate
28. Return to Allflex

Assuming that the reader has been successfully installed and commissioned, generally, reliability issues with any sort of RFID reader will fall into 2 categories. (a) Poor read / No read and (b) No Communications. Please see following a flow chart that will assist in diagnosing faults.

(a) Poor Read / No Read. If the panel reader has been in use and working previously and then unexpectedly starts performing in a less than satisfactory manner, the likely causes are

(1) Power Supply Problems
(2) New Equipment interference.

Firstly, test the power supply (battery etc). As an automotive battery loses charge from close to 14 volts, the antenna performance will remain reasonably constant but fall away badly at about 7 or 8 volts. So the first point to look at relating to reader performance should always be power first. If you have tested the battery and know that it is well charged then look at issues such as;

- Has any new electronic equipment been added close by or connected to the reader? Such as a power supplies for radios, new scale heads, computers, computer monitors etc? If so – switch them off and retest performance.
- Is there a problem with your AC power? In some cases it is possible for the earth voltage (which should be zero) to actually float. When you plug in a computer, or scale head to a panel reader, the high earth voltage is transferred to the microprocessor in the reader. This causes the reader electronics to lock up.

(b) No Communications. This would mean that the reader can actually be seen to read a tag, in that the reader beeps, the lights flash etc, but the electronic number is not appearing on the scale display, or computer screen.

Communications is the process of transferring the RFID device number (and other data) between the reader and the scale head, or computer. You may hear terms like “Serial Communications” or “Comms” or “Serial Data”. All these terms refer to the data being linked from the reader to the attached technology (Scale head, computer etc).

It is very uncommon for the serial communications ports to stop working on, either the reader, scale head or computer. The most common issues that prevent data from being transferred will be

(1) Broken cable that joins the reader to the scale / computer etc.

(2) Incorrect port / communication settings. These settings can sometimes be altered in both, the reader, scales or computers. The settings include issues like, baud rate, parity, flow control etc.

Baud rate is the speed at which the “bits” of data are sent down the wires. If baud rate and most of the other setting are not matched at both ends (reader and scale /computer) the data will not be sent.

The standard settings for the Allflex Panel Reader is 9600 baud rate, 8 Data Bits, No Parity, 1 Stop Bit and No Flow Control. These settings can be checked and changed for the panel reader by using the *Configurator* © program described earlier.

Testing Communications

You can prove that the reader is communicating by plugging the reader into your computer, powering it up (reader and computer) and starting up the *Configurator* © program. The settings should automatically appear in the *Configurator* © screen. If not select the option to "Get Settings".

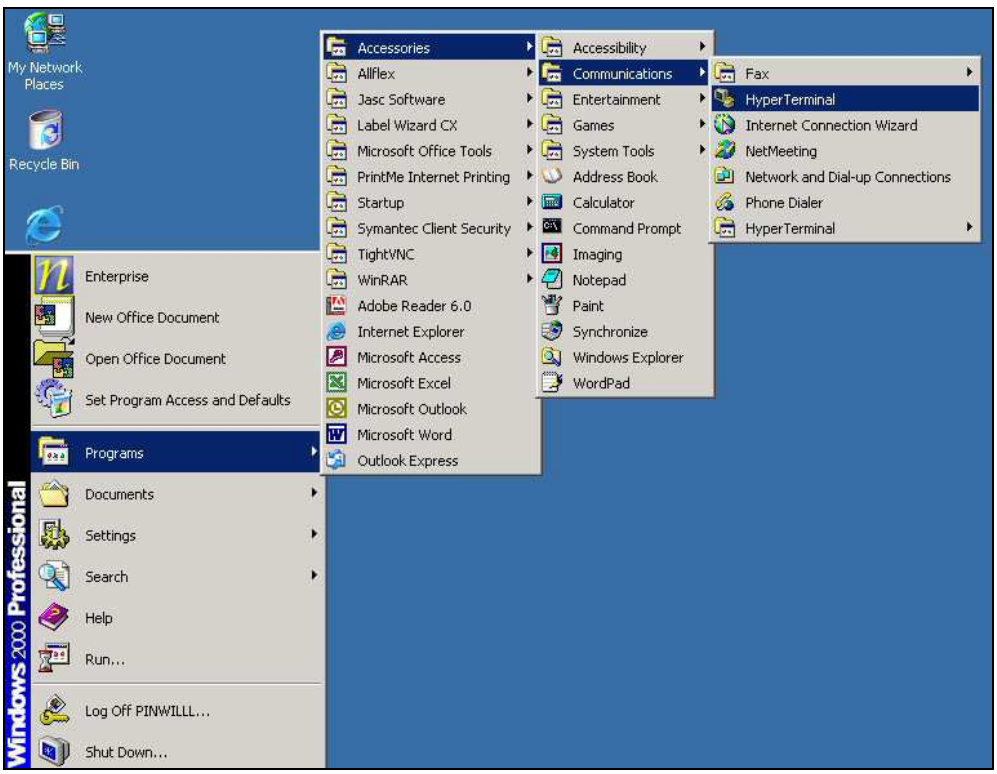
If the data does not appear it is likely that there is a problem with the communications. This might suggest that the Receive Wire is broken. Try reading a tag. The number should appear at the bottom of the screen. If it does, this would tend to confirm that it is possible that 1 wire (the Receive wire) from the Control Box might be broken. IE it can send data out but not receive data. The fact that the tag number has been received in the *Configurator* © would show that the reader is transmitting data. In this case, the reader will still work fine with most scale heads and computer programs, but you will not be able to change any settings using *Configurator® program*.

If you connect the *Configurator* © program and the nothing appears on the screen and a tag number doesn't show up after being read, it would suggest that there may be a problem with the Transmit wire. In this case, it would be advisable to close *Configurator* © program and try another program. Also if you don't have *Configurator* © program, there is another program called *HyperTerminal* © that comes installed as standard on most computers . You can also use this to test communications.

Note: you cannot operate *Configurator* ©, *HyperTerminal* ©, or any other software that uses the serial ports on your computer simultaneously. That means you can only have one program open at once.

Using HyperTerminal ©

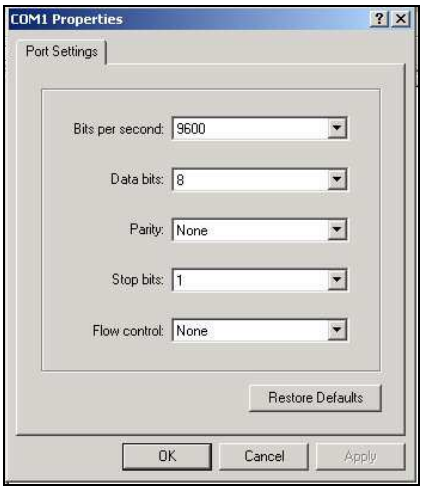
. In most computers you can find the *HyperTerminal* © program by clicking on Start, then Programs, then Accessories, Then Communications, then *HyperTerminal.*



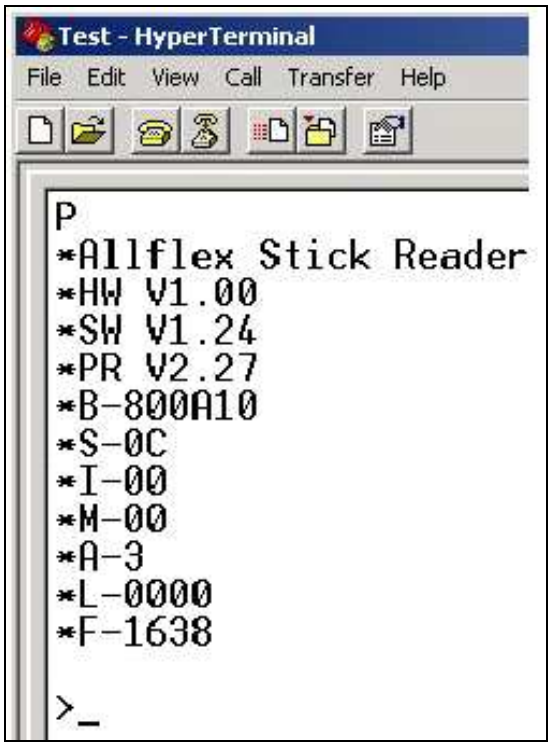
The following screen will appear when *HyperTerminal* © starts. In the Name Box, enter some name like TEST, etc then click OK.

When the following screen appears. Select, the pull down arrow in the "Connect Using" and select the appropriate Com port on your computer (usually Com1) and then click OK.

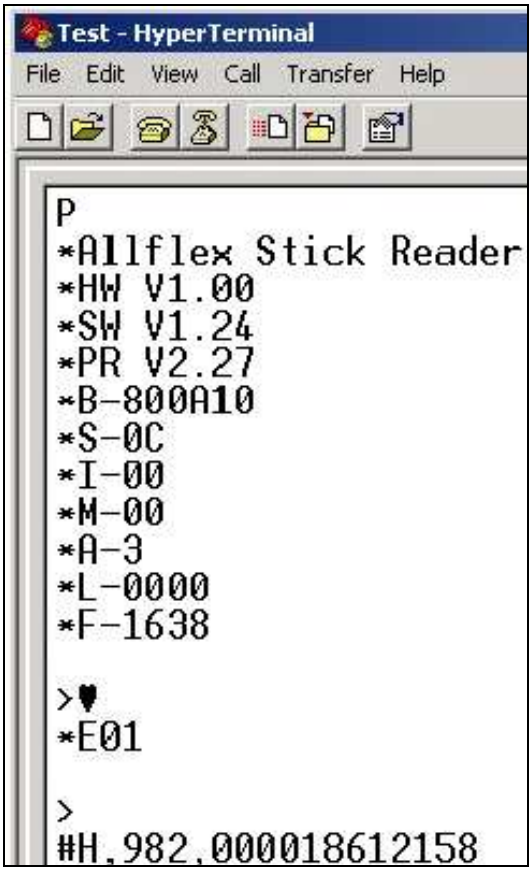
Then the properties window will appear. Change the Bits per seconds (Baud Rate) to 9600, the Data Bits to 8, the Parity to None, Stop bits 1 and Flow Control to None. Then click OK.



Then a blank Screen appears. To test if you can send information to the reader – Hold down the SHIFT key and press the letter “p”. A capital P should appear and then followed by data gathered from the panel reader, similar to that shown below.



When you scan a tag, the number should now appear.

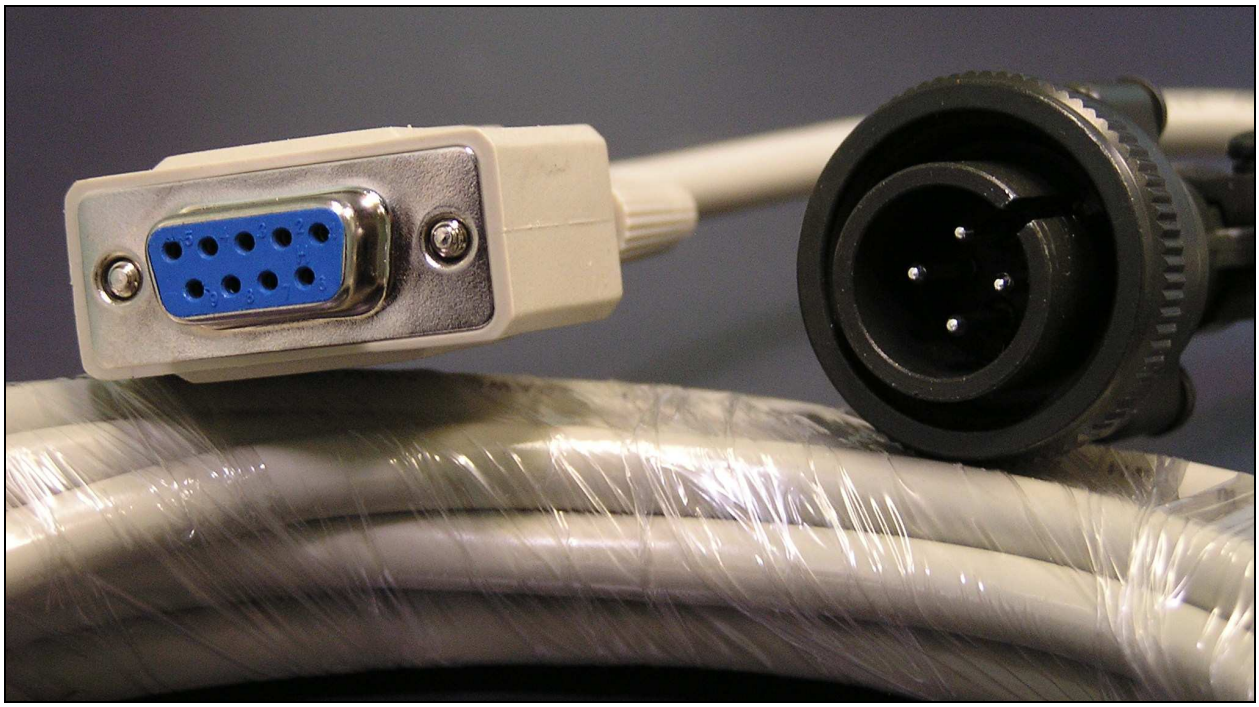


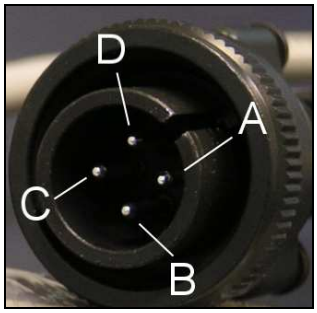
Now we know that the panel reader is both reading and communicating effectively. This test proves that the cable is also functioning. The P signal means that the PC is communicating with the Reader and the returned Tag ID means that the reader is communicating with the PC. You should then check other equipment such as the scale head or computer to confirm they are operating correctly.

Testing a Cable with a Multi-Meter

A useful test tool to have available is a Multi-Meter. In particular, a model that can measure DC volts and ideally has an audible continuity (Ohms) selection. Multi-meters can be purchased from electronics stores and can range in price from $10 upwards. If you were anticipating buying a multi-meter to use specifically for this equipment, a cheap unit around $10 - $30 will be sufficient.

If you have tested the communications using *HyperTerminal* © or *Configurator* © and suspect that the cable may be damaged you can use a multi-meter to test for broken wires. Standard communications cables as used for the Panel Reader, are based upon 3 wires. These wires are Signal Ground, Transmit and Receive. The cable provided has a 9 pin female D connector on one end and a 4 pin male military connector on the other. (As shown in the picture below).





The D connector is marked with numbers 1 through to 9 and the military with letters A, B, C & D.

The table below shows how the cables should connect from one end to the other.

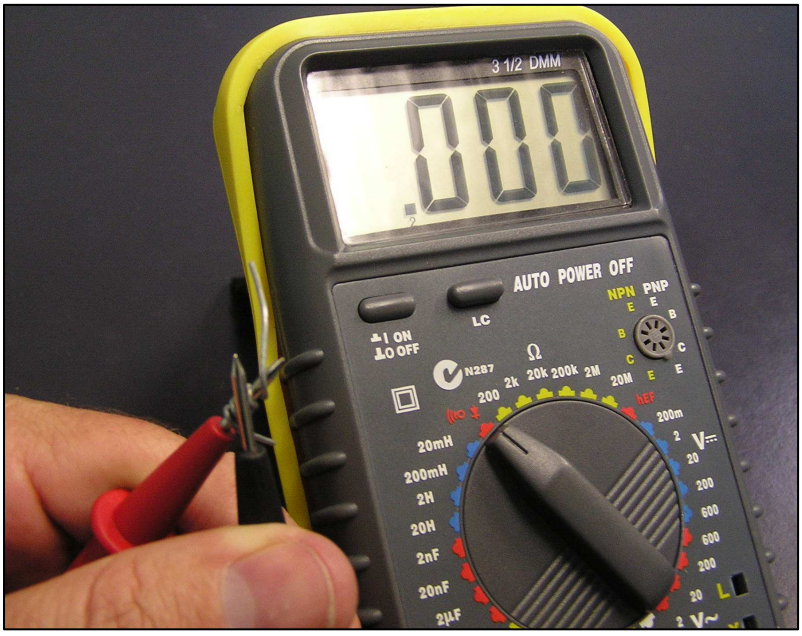
Electronic Circuit Board	Military Connector	9 pin D Connector
Transmit (TxD)	Pin A	Pin 2
Receive (RxD)	Pin B	Pin 3
Signal Ground (GND)	Pin D	Pin 5
	Pin C (not used)	

You can test these connections using the Multi-meter.

On the dial of the meter select the Ω scale. If your meter has an audible beeper, select that setting, if not select the lowest value in the scale.

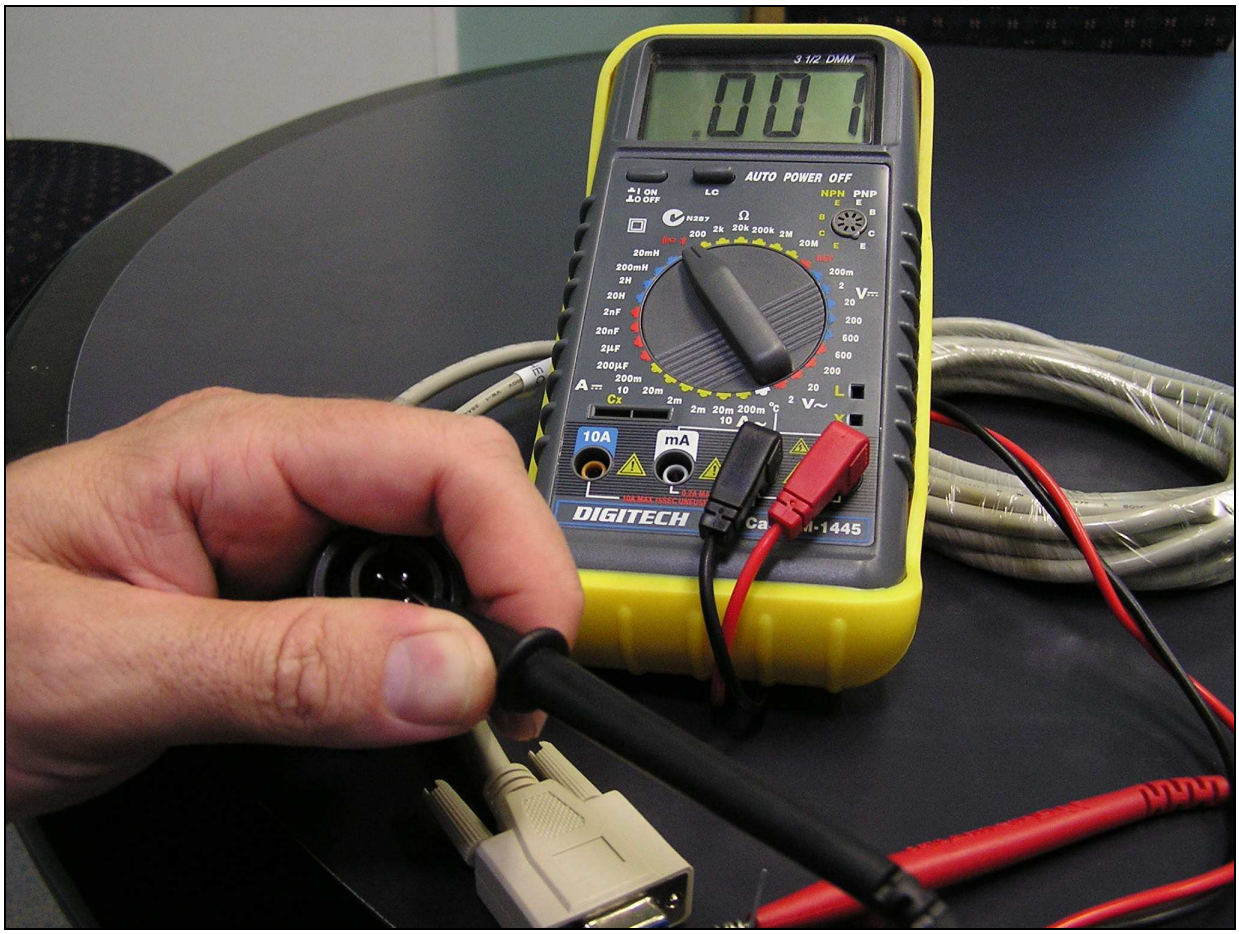
Insert the test leads into the meter, the Black lead connects to the COM socket and the Red lead connects to the socket showing the Ω Omega symbol.

To see how the meter should work – touch the two test leads together and you will hear the beeper sound (if your meter has a beeper) and the screen, or dial will go from open circuit to short circuit (zero ohms).



Twist a paper clip around the end of one test lead. Then insert the paper clip into Pin 2 on the D connector. From the table above, you can see that Pin 2

should connect to Pin A on the military connector. Therefore touch the second test lead against Pin 2, if the cable is correctly joined you will hear the meter beep and see the dial or display show zero, or almost zero ohms.



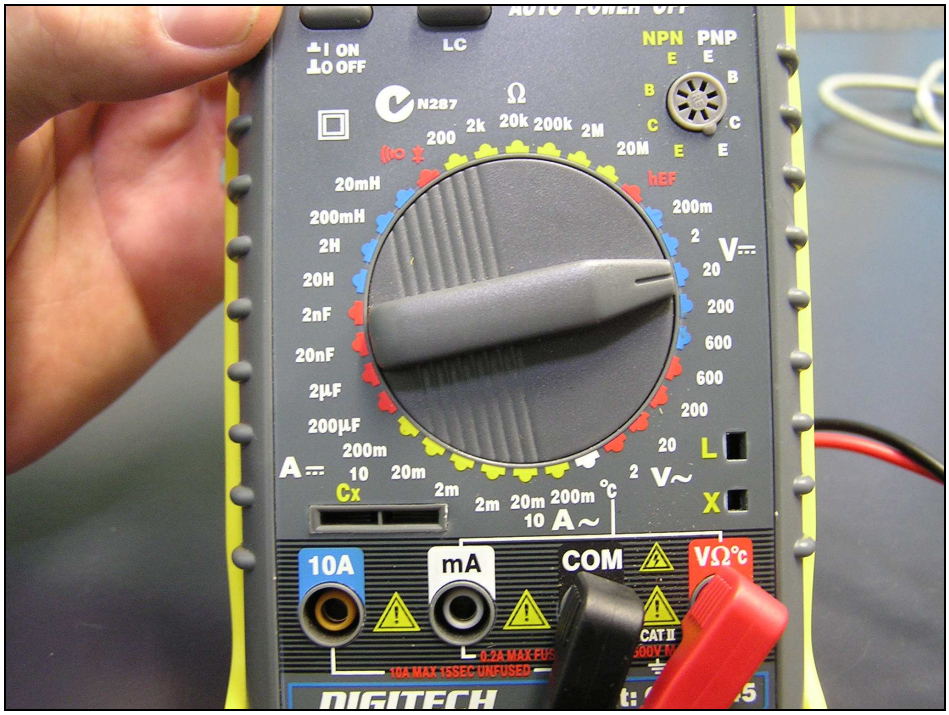
Use the table above and use the same process to also check the connections for Pin 3 and Pin 5 on the D connector and ensure that the cable is not broken. If you test any of the 3 wires and find that they do not connect, you should use a replacement cable, or, open the military connector and re-solder any wires that you can see have become detached.

If you can see the cable is broken at some point in the centre, you can make a temporary repair by stripping back the 3 relevant wires, twisting each one together separately and sealing with insulation tape. You will know what coloured wires to join by opening up the military connector and seeing the 3 wires that terminate. (As a standard Allflex usually uses White, Green and Yellow).

Apart from the cable breaking (open circuit), it could happen that the cable gets exposed to direct rain and that water is shorting out some of the pins. To test this, insert the paper clip to Pin 2 and then test to Pin A, B and D on the other end. As you see from the table above, the cables should only join from one point on one end and to a specific point on the other end. If you notice that there is a join between multiple points this indicates that there is a short circuit. Open the military connector and see if it has water inside and spray with water dispersant spray if required.

Testing If A Battery Is Charged And Working.

As mentioned a Multi-Meter can also measure voltage. If the reader is performing below standard you can check the battery voltage by following these steps. Insert the black test lead into the socket on the meter called Com. Insert the Red test lead into the socket that has the V shown. On the selector switch, select DC Volts and the 20 volts scale. This may be shown as V== (as opposed to AC volts which might be shown V~)



Hold the black test lead against the negative (-) terminal on the battery and the red test lead against the positive terminal (+) on the battery. If the meter shown less that 10 volts, you should consider recharging or swapping the battery.

Did this solve the problem?

If you have tried everything discussed in the fault finding brochure and the problem still persists, please do not hesitate to call your local Allflex office for over the phone fault finding advice.

APPENDIX 1 – Serial Command Language

Panel Reader V0.46 Communications Protocol

Version A

PREPARED BY: GÜNTHER NEGER

© 03/02 **ALLFLEX S.A. BOULDER**

1. Purpose and Scope

This document is a full description of the serial communication protocol of the Allflex Stick Reader with software version 0.46. It is intended for Allflex internal use only.

2. General Issues

The reader acknowledges every valid received character by looping it back to the sender. Invalid commands or parameters are responded with an error code. The type of handshaking supported is software controlled XON/XOFF.

Hexadecimal values from A to F can be entered either in upper or lower case.

All serial commands using parameters can be interrupted without changing the options by sending the ESC character.

3. ASCII Protocol

3.1. Unrequested Transmission Messages

3.1.1. Turn-On Initialization String

Upon powering the reader on, the unit sends as an initialization string <STX><CR> followed by a line feed character <LF>.

3.1.2. Transponder Identification Codes

There are several ID-Code string formats. The options are user selectable.

With all options enabled, a typical ID-Code will be transmitted in the following format:

#T*RRRRR*D*EEEE*IIIIIIIIIII<CR><LF> .. decimal
#T*RRRR*D*EEE*IIIIIIIII<CR><LF> .. hexadecimal

,where:

= Initial Character (“#”, “L”, “X”, “G” or none)

T = Tag Type Code (ALLFLEX[1] type, TIRIS[1] type or none)

* = Field Delimiter (is either a comma, a semicolon, a space, a tabulator or none)

R = Reserved Field (optional, available for ISO tags only 5 decimal or 4 hexadecimal figures)

D = Data Block Flag (optional, available for ISO tags only 1 decimal figure)

E = Extended Code (optional, Country or Manufacturers Code of ISO coded transponders with 3 decimal or hexadecimal figures, Application Code of HDX-Industrial transponders with 4 decimal or 3 hexadecimal figures)

I = National Identification Code (ISO tags: 12 decimal figures or 10 hexadecimal figures. HDX-Industrial tags: 16 decimal figures and 13 hexadecimal figures)

<CR> = Carriage Return (=0Dh)

<LF> = Line Feed (=0Ah)

[1] please see detailed description of transponder type codes in the next chapter 3.1.2.1.

3.1.2.1. TRANSPONDER TYPE CODES

a.) Allflex Style

TRANSPONDER TYPE	TYPE CODE
HDX-ISO	H
HDX-Industrial Read Only	R
HDX-Industrial Read/Write	W
FDX-B ISO	F

b.) TIRIS Style

TRANSPONDER TYPE	TYPE CODE
HDX-ISO	A
HDX-Industrial Read Only	R
HDX-Industrial Read/Write	W
FDX-B ISO	A

3.1.3. Error Codes

ERROR CODE	DESCRIPTION
*E00	Command couldn't be executed
*E01	Unknown command
*E02	Number of parameters
*E03	Illegal parameter(s)

3.2. Stick Reader Commands

COMMAND	DESCRIPTION	SECTION
P	Ping with Settings	3.2.1.
p	Ping without Settings	3.2.2.
S	Write Serial Hardware Settings	3.2.3.
s	Read Serial Settings	
I	Write Various Settings	3.2.4.
i	Read Various Settings	
B	Write Serial ID-Code Format Settings	3.2.5.
b	Read Serial ID-Code Format Settings	
R	Start Reading Cycle	3.2.6.
A	Write Read-Time	3.2.7.
a	Read Read-Time	
J	Write Exciter Pulse Period	3.2.8.
j	Read Exciter Pulse Period	
K	Write Exciter Pause Period	3.2.9.
k	Read Exciter Pause Period	
U	Write FDX Delay	3.2.10.
u	Read FDX Delay	
W	Write Serial Bus Address	3.2.11.
w	Read Serial Bus Address	
V	Request Reader Versions	3.2.12.
r	Re-Send Last Tag (RS232 Port Mode) Request Buffered Tag Data (RS422 and RS485 Port Mode)	3.2.13.
G	Retrieve ID Code Buffer	3.2.14.
C	Clear ID Code Buffer	3.2.15
l	Read ID Code Buffer Fill Level	3.2.16.
f	Read ID Code Buffer Free Level	3.2.17.
? or H or h	Get Help on Commands	

3.2.1. Ping With Settings

Retrieves current option settings.

Command: **P**

Readers Response[1]:	
wo/Command Prompt[22]	w/Command Prompt[2]
<CR><LF> *Allflex Panel Reader<CR><LF> *HW V1.01<CR><LF> *SW V0.46<CR><LF> *PR V2.26<CR><LF> *B-840239<CR><LF> *S-0C00<CR><LF> *I-05<CR><LF> *W-00<CR><LF> *A-3<CR><LF> *L-0000<CR><LF> *F-0200<CR><LF>	<CR><LF> *Allflex Panel Reader<CR><LF> *HW V1.01<CR><LF> *SW V0.46<CR><LF> *PR V2.26<CR><LF> *B-840239<CR><LF> *S-0C00<CR><LF> *I-05<CR><LF> *W-00<CR><LF> *A-3<CR><LF *L-0000<CR><LF> *F-0200<CR><LF> <LF> >

3.2.2. Ping Without Settings

Re-triggers reader timeout and allows to check if the unit is turned on.

Command: **p**

Readers Response:	
wo/Command Prompt[2]	w/Command Prompt[2]
<CR><LF>	<CR><LF> <LF> >

[1] The shown parameters are the default settings!

[2] See section 3.2.5. Serial ID-Code format settings.

3.2.3. Serial Hardware Settings

Changes serial port hardware parameters. Unassigned bit values are always deleted to zero!

Write Command: **S**
Read Command: **s**

Write Command Parameters: xxxx<CR>, where xxxx is a hexadecimal value.

Readers Response:	
wo/Command Prompt[3]	w/Command Prompt[3]
<CR><LF> *S-xxxx<CR><LF>	<CR><LF> *S-xxxx<CR><LF> <LF> >

Write Command Parameter Bit Assignments:

BIT #	FUNCTION
0 - 1	Port Type
2 - 7	Not used
8 - 10 (0=LSB)	Bit Rate
11	Data Bits
12 - 13	Parity
14	Flow Control
15	Not used

```
0000000000000000b
|||||||||||||||
|||||||||||||++--> Port Type      (00 = *RS232, 01 = RS422, 10 = RS485)
|||||||++++++----> Not used
|||||+++----------> Bit Rate              (000 = 300 baud, 001 = 1200 baud)
|||||                                     (010 = 2400 baud, 011 = 4800 baud)
|||||                                     (100 = *9600 baud, 101 = 19200 baud)
|||||                                     (110 = 38400 baud, 111 = 57600 baud)
||||+----------> Data Bits      (1=*8 Bits, 0=7 Bits)
||++---------->  Parity         (000= *none, 01 = even, 10 = odd)
|+---------->    Flow Control   (1=XON/XOFF, 0=*none)
+---------->     Not used
```

[3] See section 3.2.5. Serial ID-Code format settings.

3.2.4. Various Settings

Changes readers operational options. Unassigned bit values are always deleted to zero!

Write Command: **I**
Read Command: **i**

Write Command Parameters: xx<CR>, where xx is a hexadecimal value.

Readers Response:	
wo/Command Prompt[4]	w/Command Prompt[4]
<CR><LF> *I-xx<CR><LF>	<CR><LF> *I-xx<CR><LF> <LF> >

Command Parameter Bit Assignments:

BIT #	FUNCTION
0 (=LSB)	Beep/LED
1	Not used
2	Read Mode
3 - 5	Not used
6	Wireless Synchronization
7	Master/Slave

00000000b
||||||||
|||||||+---> Beep/LED (1=First Read, 0=*Every Read)
||||||+----> Not used
|||||+-----> Read Mode (1=*Continuous, 0=Requested)
||+++------> Not used
|+---------> Wireless Synchronization (1=On, 0=*Off)
+----------> Master/Slave (1=Slave, 0=*Master)

3.2.5. Serial ID-Code Format Settings

Changes serial ID-Code format options. Unassigned bit values are always deleted to zero!

Write Command: **B**
Read Command: **b**

Write Command Parameters: xxxxxx<CR>, where xxxxxx is a hexadecimal value.

[4] See section 3.2.5. Serial ID-Code format settings.

Readers Response:	
wo/Command Prompt	w/Command Prompt
<CR><LF> *B-xxxxxx<CR><LF>	<CR><LF> *B-xxxxxx<CR><LF> <LF> >

Command Parameter Bit Assignments:

BIT #	**FUNCTION**
0 (=LSB) - 2	Initial Character
3 - 4	Field Delimiter Character
5 - 6	Tag Type Identifier
7	Field Delimiter Character (MSB)
8	Country Code
9	Leading Zeroes
10	Raw Format
11	Command Prompt
12 - 15	Not used
16	Number Format
17	Not used
18	Transmit Duplicate Reads
19 - 20	Not used
21	Send Reserved Field
22	Send Data Block Flag
23	Send Extended Code

```
000000000000000000000000b
||||||||||||||||||||||||
||||||||||||||||||||+++--->   Initial Character    (000="#", 001=*"L", 010="X",
||||||||||||||||||||                                011="G", 100=None)
||||||||||||||||||++----->   Field Delimiter      (000=TAB, 001=";", 010=",",
||||||||||||||||||                                011=*SPACE, 100=None)
||||||||||||||||++------->   Tag Type Identifier  (00=Allflex, 01=*TIRIS,
10=none)
||||||||||||||||+--------->   Field Delimiter (MSB)
||||||||||||||||+---------->   Country Code       (1=Numeric, 0 =*ISO 3166
Alpha)
|||||||||||||||+----------->   Leading Zeroes     (1=*Yes, 0=No)
||||||||||||||+------------>   Raw Format         (1=Yes, 0=*No)
|||||||||||||+------------->   Command Prompt    (1=Yes, 0=*No)
|||||||||++++--------------->   Not used
||||||||+------------------->   Number Format     (1=Hexadecimal, 0=*Decimal)
|||||||+-------------------->   Not used
||||||+--------------------->   Send Duplicates   (1=*Yes, 0=No)
|||++----------------------->   Not used
||+------------------------->   Reserved Field    (1=On, 0=*Off)
|+-------------------------->   Data Block Flag   (1=On, 0=*Off)
+--------------------------->   Extended Code     (1=*On, 0=Off)
```

Example - The command B800210<CR><LF> sets options as follows:
[800210 (hexadecimal) = 1000 0000 0000 0010 0001 0000 (binary)]

Initial character is 000 = "#"
Delimiter character low is 10 = "," (comma)
Tag Type Identifier is 00 = Allflex Style
Delimiter character high is 0 = "," (comma)
Country Code is 0 = ISO 3166 Alphanumeric
Leading Zeroes is 1 = Yes
Raw Format is 0 = No
Command Prompt is 0 = No
(Not used is 0000)
Number Format is 0 = Decimal
(Not used is 0)
Send Duplicates is 0 = No
(Not used is 00)
Reserved Field is 0 = Off
Data Block Field is 0 = Off
Extended Code is 1 = On

3.2.6. Start Reading Cycle

Using requested reading the reader starts transponder detection for the defined reading time. If the reader is already carrying out a transponder detection, the reader retriggers read time. Using continuous reading, the reception of the command is ignored.

Command: **R**

Parameters: none

Readers Response:	
wo/Command Prompt[5]	w/Command Prompt[5]
<CR><LF>	<CR><LF> <LF> >

[5] See section 3.2.5. Serial ID-Code format settings.

3.2.7. Read Time

Sets read time for requested readings in seconds. Legal values range from one to nine seconds!

Write Command: **A**
Read Command: **a**

Write Command Parameters: x<CR>, where x is a decimal value.

Readers Response:	
wo/Command Prompt[6]	w/Command Prompt[6]
<CR><LF> *A-x<CR><LF>	<CR><LF> *A-x<CR><LF> <LF> >

3.2.8. Exciter Pulse Period

Changes exciter pulse period setting. The parameter issued must be multiplied by five to calculate the exciter pulse timing in milliseconds. Supported are values between 3h and 28h, equaling 15 ms to 200 ms.

Write Command: **J**
Read Command: **j**

Write Command Parameters: xx<CR>, where xx is a hexadecimal value.

Readers Response:	
wo/Command Prompt[6]	w/Command Prompt[6]
<CR><LF> *J-xx<CR><LF>	<CR><LF> *J-xx<CR><LF> <LF> >

[6] See section 3.2.5. Serial ID-Code format settings.

3.2.9. Exciter Pause Period

Changes exciter pulse period setting. The parameter issued must be multiplied by five to calculate the exciter pause timing in milliseconds. Supported are values between 4h and FFh, equaling 20 ms to 1275 ms.

Write Command: **K**
Read Command: **k**

Write Command Parameters: xx<CR>, where xx is a hexadecimal value.

Readers Response:	
wo/Command Prompt[7]	w/Command Prompt[7]
<CR><LF> *K-xx<CR><LF>	<CR><LF> *K-xx<CR><LF> <LF> >

3.2.10. FDX Delay Period

Changes FDX delay setting. The parameter issued must be multiplied by five to calculate the FDX delay time in milliseconds. Supported are values between 1h and 8h, equaling 5 ms to 40 ms.

Write Command: **U**
Read Command: **u**

Write Command Parameters: xx<CR>, where xx is a hexadecimal value.

Readers Response:	
wo/Command Prompt[7]	w/Command Prompt[7]
<CR><LF> *U-xx<CR><LF>	<CR><LF> *U-xx<CR><LF> <LF> >

[7] See section 3.2.5. Serial ID-Code format settings.

3.2.11. Serial Bus Address

Changes the current serial bus address. The serial bus address is used with RS422 and RS 485 serial port mode. Supported serial bus addresses range from 0 to 1F hexadecimal (equals 0 to 31 decimal).

Write Command: **W**
Read Command: **w**

Write Command Parameters: xx<CR>, where xx is a hexadecimal value.

Readers Response:	
wo/Command Prompt[8]	w/Command Prompt[8]
<CR><LF> *W-xx<CR><LF>	<CR><LF> *W-xx<CR><LF> <LF> >

3.2.12. Request Reader Versions

Transmits version numbers for hardware, software and serial protocol plus the reader product name.

Command: **V**

Parameters: none

Readers Response:	
wo/Command Prompt[8]	w/Command Prompt[8]
<CR><LF> *Allflex Panel Reader<CR><LF> *HW V1.01<CR><LF> *SW V0.46<CR><LF> *PR V2.26<CR><LF>	<CR><LF> *Allflex Panel Reader<CR><LF> *HW V1.01<CR><LF> *SW V0.46<CR><LF> *PR V2.26<CR><LF> <LF> >

[8] See section 3.2.5. Serial ID-Code format settings.

3.2.13. Re-Send Last Tag

In case port type is set to RS232 the reader re-sends last tag read according to the currently selected ID-Code format settings. In serial bus mode, where port type is set to either RS422 or RS485, the reader transmits the first read result stored in the ID code buffer out the serial port, according to the currently selected ID-Code format settings[8]. This way the readers can be polled to request tag data from the readers connected to the bus, as the readers using serial bus mode then do not automatically send tag data upon successful detection.

Command: **r**

Parameters: none

Readers Response - No Tag Available:	
wo/Command Prompt[9]	w/Command Prompt[9]
<CR><LF> *E00<CR><LF>[10]	<CR><LF> *E00<CR><LF>[10] <LF> >

3.2.14. Retrieve ID-Code Buffer

Retrieves the entire ID-Code buffer.

Command: **G**

Parameters: none

Readers Response – Tag Available:
The Reader transmits the entire ID-Code memory according to the current serial ID-Code format settings[9]. If the command prompt is enabled, the readers response is trailed by: <LF> >

Readers Response - No Tag Available:	
wo/Command Prompt[11]	w/Command Prompt[11]
<CR><LF> *E00<CR><LF>[12]	<CR><LF> *E00<CR><LF>[12] <LF> >

3.2.15. Clear ID-Code Memory

Deletes the entire ID-Code memory.

[9] See section 3.2.5. Serial ID-Code format settings.

[10] Error Message: Command couldn't be executed!

[11] See section 3.2.5. Serial ID-Code format settings.

[12] Error Message: Command couldn't be executed!

Command: **C<CR>**

Readers Response:	
wo/Command Prompt[11]	w/Command Prompt[11]
<CR><LF>	<CR><LF> <LF> >

3.2.16. Request ID-Code Buffer Fill Level

Requests the number of currently buffered tags.

Command: **l**

Parameters: none

Readers Response - No Tag Available:	
wo/Command Prompt[11]	w/Command Prompt[11]
<CR><LF> *L-0000<CR><LF>	<CR><LF> *L-0000<CR><LF> <LF> >

3.2.17. Request ID-Code Buffer Free Level

Requests the number of available tags in buffer.

Command: **f**

Parameters: none

Readers Response:	
wo/Command Prompt[13]	w/Command Prompt[13]
<CR><LF> *F-0200<CR><LF>	<CR><LF> *F-0200<CR><LF> <LF> >

[13] See section 3.2.5. Serial ID-Code format settings.

4. Bus Protocol

Serial bus communication is active when serial port type is set to either RS422 or RS485. The reader accepts in this mode framed as well as unframed (RS232 port type typical, as described in section 3. ASCII protocol) commands. Readers responses to both framed and unframed received commands are always framed.

Up to 32 readers can be addressed on the bus. Therefore each reader on the bus has to have a unique bus address assigned! The Allflex Panel Reader does not respond to received frames containing a different address than the own!

The data part of the framed message is equal to the ASCII protocol described in section 3. Commands can be issued enclosed in the frame.

The reader in bus mode does not automatically send tag reading results! These are temporarily stored in ID code buffer and can be requested by use of the command r (described in section 3.2.13.). This command requests the first ID code stored and clears the record upon transmission. The first tag data will be overwritten with new tag data once the buffer is full without indication.

Command responses in bus mode lack initial and ending carriage return and line feed characters!

4.1. Framing

The Allflex Panel reader uses a simple framing. Each message begins with SOH (02h), followed by the binary reader address[14], a STX (03h), the data and as the terminating character an EOT (04h).

```
<SOH><ADDR><STX>< .. DATA .. ><EOT>
  |    |    |         |      |
  |    |    |         |      +--> End of Text (04h)
  |    |    |         +-----------> Data, as described in section 3. ASCII protocol
  |    |    +---------------------> Start of Text (03h)
  |    +--------------------------> Readers bus address (00h to 1Fh) [12]
  +-------------------------------> Start of Heading (02h)
```

[14] Please see section 3.2.11. on how to change the serial bus address.